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**I.T. FUELS
JETBLUE TAKEOFF**
In a Troubled Industry,
One Airline's Strategy
for Success Page 72

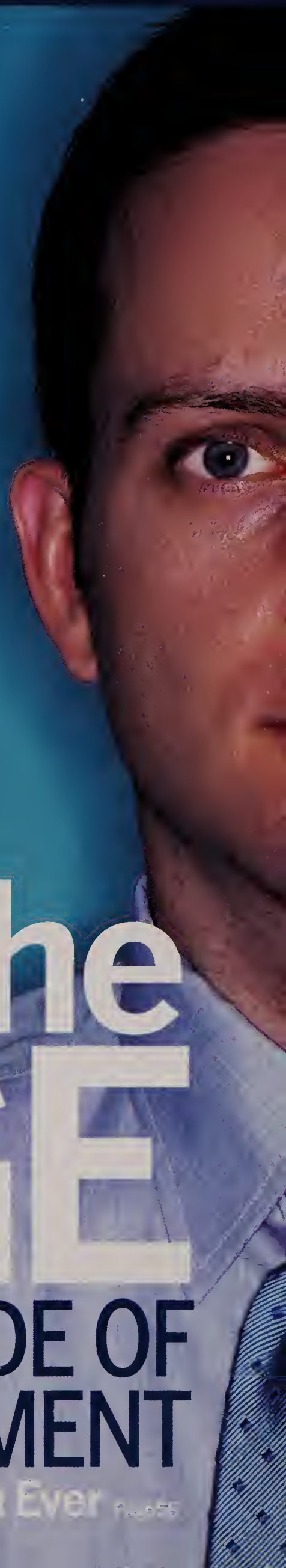
**WIRELESS LANS:
CHEAP, COOL AND
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5 Ways to Secure
Your Network Page 80

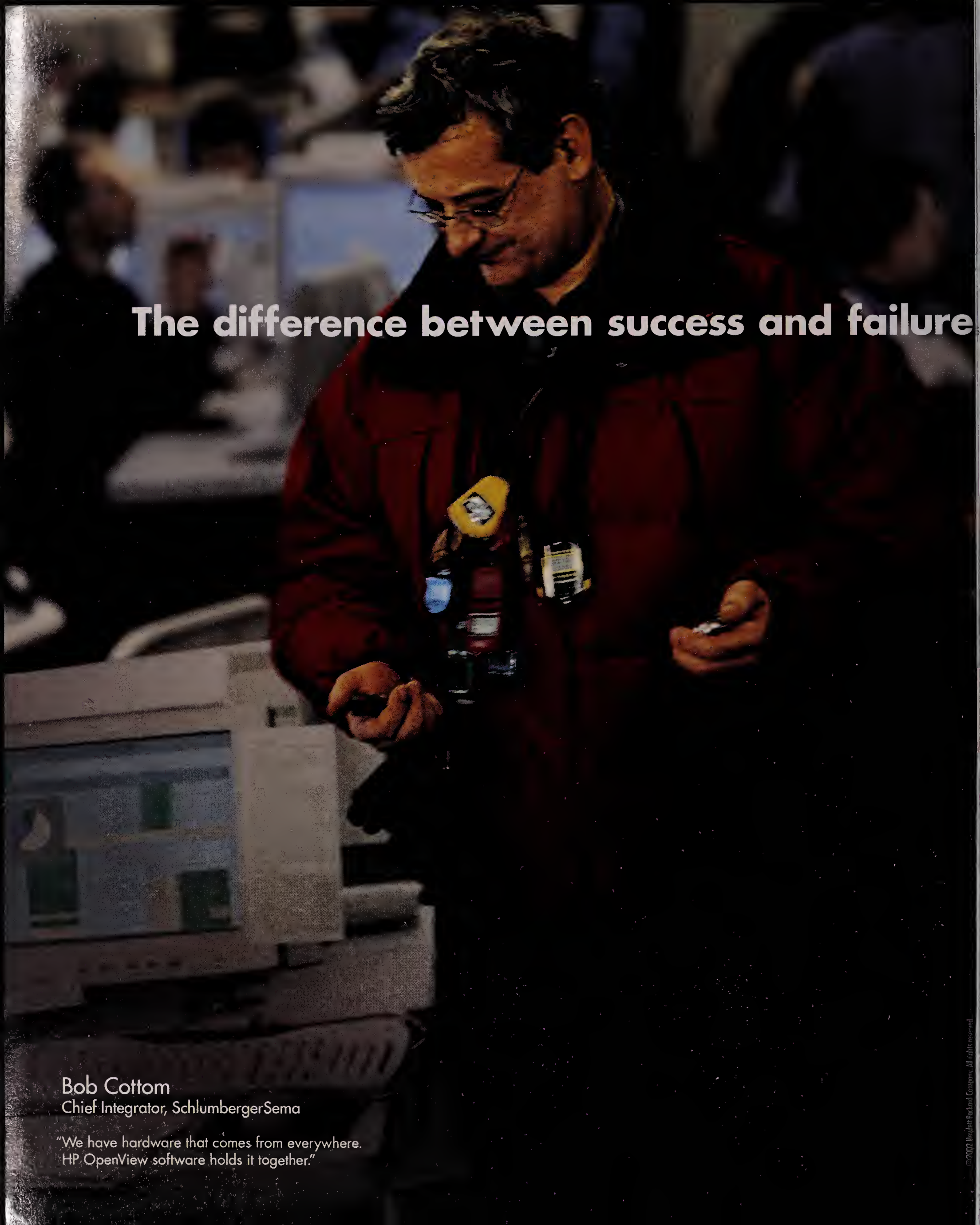
GATEWAY TO ASIA
Doing Business in
Singapore Page 88

TAKE the PLEDGE

THE CIO's CODE OF ETHICAL DATA MANAGEMENT

Why Doing the Right Thing Matters More Than Ever Page 55



A man with glasses, wearing a red jacket, is focused on working on a computer monitor. He is holding a small tool or component. The background is a blurred crowd of people, suggesting a busy event or conference. The lighting is dramatic, with the man's face and jacket highlighted against the darker background.

The difference between success and failure

Bob Cottom
Chief Integrator, SchlumbergerSema

"We have hardware that comes from everywhere.
HP OpenView software holds it together."

1/1000th of a second. And with so much at stake, IT managers at SchlumbergerSema can't waste time when it comes to wiring some of the world's largest sporting events.

Which is why they head to best-of-breed vendors. Servers, PC's, printers, routers, switches and databases are spec'd from the usual suspects, but they also need comprehensive management software to tie all of this disparate hardware together.

And in one recent case, HP OpenView management software perfectly fit the bill.

The assembled infrastructure handled everything from security check-ins to live time stats to e-mail intranets for athletes, coaches and statistic-hungry media—instantaneously. That meant up to 25,000 different system interfaces, including 10,000 live nodes, all controllable from a centralized mission-critical data center. All told, thousands of workers and millions of viewers had real-time stats, updates and forecasts—the instant points went on the board. (Incidentally, the computer system took care of that too.)

Whatever the event, keeping all these plates spinning is always quite a challenge, and HP OpenView handles it by providing monitoring systems that spot trouble and avert downtime. And with so much always riding on so little time, SchlumbergerSema can't spare an instant for a single system holdup.

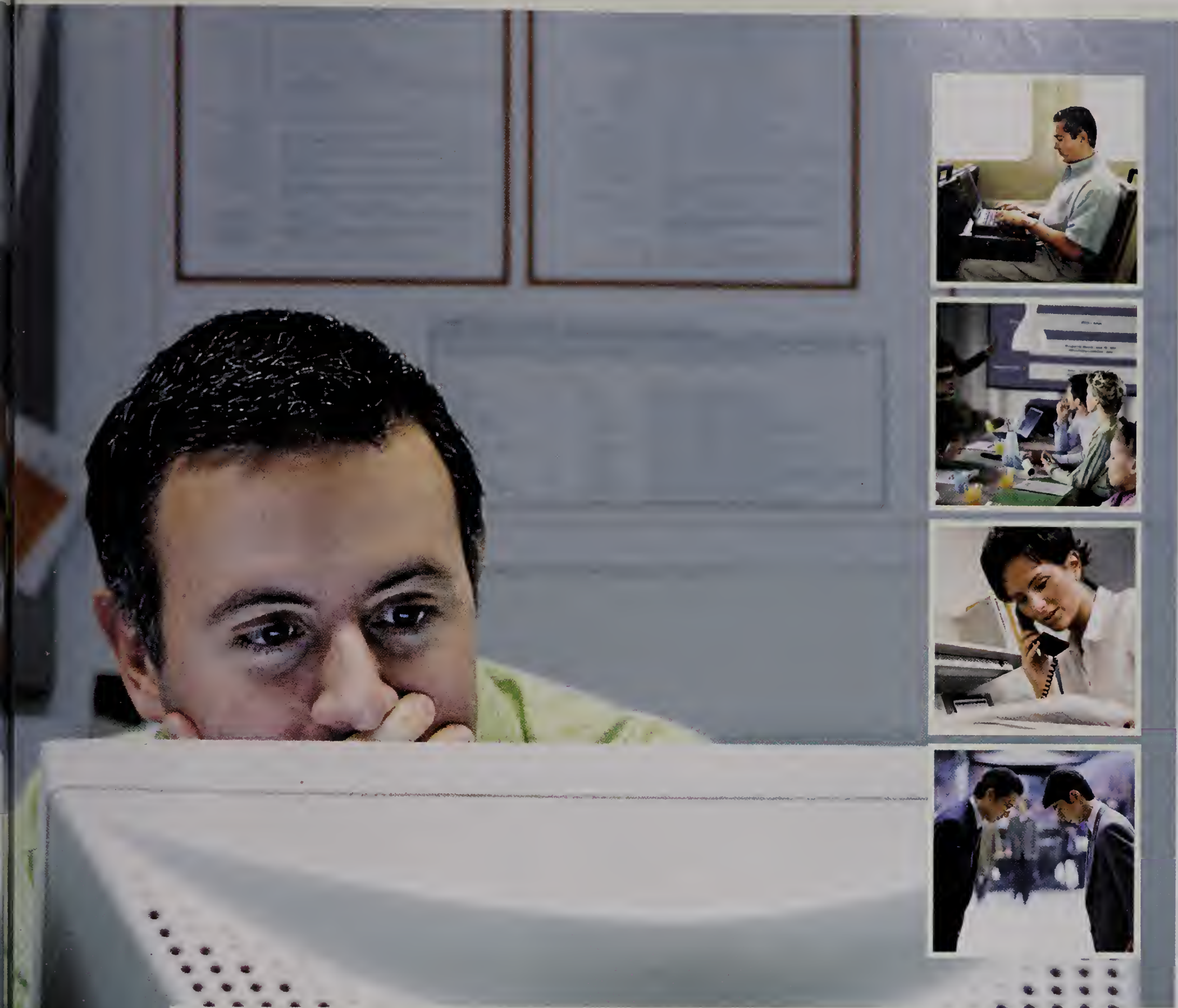
HP infrastructure solutions are engineered for the real world of business. Because the last time we checked, that's where we all work. For more information on how HP OpenView software can keep your business racing along, call 1.800.HPASKME, ext. 246. Or visit www.hp.com/go/infrastructure.

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VOL. 15 • NO. 18 • JULY 1, 2002

Cover Story

ETHICS | 56

TAKE the PLEDGE

Data has no ethics. Data doesn't care how it's used. But the use and misuse of data has become the critical issue for today's information-intensive enterprise. And now CIOs are working to develop a code for ethical data management. *By Scott Berinato*

COVER PHOTO BY FURNALD/GRAY



Features

INTERVIEW

The IT Inside the World's Biggest Company | 64

Long publicity shy, Wal-Mart opens its doors for an exclusive CIO interview with CIO Kevin Turner, who shares the secrets behind Wal-Mart's global growth, what's happened since Sept. 11 and which technologies the retailer is eyeing for the future.

By Abbie Lundberg



"Technology at this point is simply a means to an end," says Wal-Mart CIO **Kevin Turner**. "What is really strategic is the use of information and how we exploit and maximize it." For more on Wal-Mart's 36-year-old CIO, see Page 64.

STARTUP STRATEGIES

JetBlue Skies Ahead | 72

The founders of JetBlue Airways use IT as the backbone of their "high-tech, high-touch" startup. Can you say, "last-mover advantage"? *By Stephanie Overby*

WIRELESS SECURITY

Cheap, Cool and Dangerous | 80

A grassroots wireless LAN movement is rolling onto the networks of unsuspecting CIOs. It might already be too late to stop its spread, but it's not too late to make it secure. *By Sarah D. Scalet*

GLOBAL BUSINESS

First Stop, Singapore | 88

The promise of entering the vast Asian marketplace has lured global companies to Singapore by the thousands. But no matter how Westernized and business-friendly the city-state may seem, it's important to remember that it's not home and the rules are different. *By Tom Field*

MORE ►►►



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INFORMATION COMING INTO YOUR BUSINESS THAN EVER BEFORE.

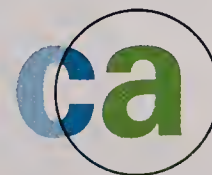
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A man in a dark suit and light-colored shirt is looking down at a small mobile device he is holding with both hands. He is standing in a modern building with a glass and steel structure. The background shows a grid of dark lines against a light sky. A solid blue rectangular box is positioned in the upper right area of the image, containing white text.

once again,
our technology is
making noise.

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it's just happening in
remote warehouses.

Once again, people are talking about Palm innovations. Only this time, it's at companies building solutions for their enterprise. Like streamlining order fulfillment. Or mobilizing sales forces. Or simplifying access to information. Along with leading solutions providers that include BEA,

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Leading IT in your company is your responsibility—regardless of whom you call boss. *By Gary Beach*

TOTAL LEADERSHIP How Does Your Workforce Grow? | 44

Effective leadership requires equal parts of long-range planning and regular pruning. *By Christopher Hoenig*

REALITY BYTES Summertime and the Books Are Cheesy | 108

Every season is the silly season in the business books field. But summertime is the time to sample them. *By Megan Santosus*

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On Assignment

By Jerry Gregoire

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New predictive intelligence tools may clear cloudy futures. *By David L. Margulius*

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A new DNA computer—it's more like a biochemistry lab than a PC.

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Hype aside, here's what to expect as nanotechnology grows up.

By Thomas N. Theis

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Does your company have clearly defined data privacy guidelines? It should.

By Abbie Lundberg

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Abstracts of all the feature stories found in this issue.



"I've been consistently awestruck by how damaging one bad employee can be. Every leader I've ever met has a secret name for these employees: 'bad apple,' 'black hole,' 'cancerous.'"

—Christopher Hoenig, Total Leadership columnist, on pruning your IT staff Page 44

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WEB >connections

WEIGH IN

Is it up to the CIO to start the conversation about the ethical uses of data?

Data doesn't care how it's used. **Take the Pledge** (Page 56) argues that it's the responsibility of the CIO to police the ethical management of data. Do you agree? Have you taken steps to develop guidelines for your company? Weigh in with your opinions.



Jerry Rode, CIO of Saab Cars USA

CIO READER POLL

Do you accept the CIO's Six Commandments?

Members of the CIO Best Practice Exchange endorsed six commandments of ethical data management (**Take the Pledge**). Now's your turn to cast your vote—and your comments.

ASK THE SOURCE

How do you scale your IT capabilities as the business continues to grow?

CIO Jeff Cohen started at JetBlue Airways with one mandate: Automate everything (**JetBlue Skies Ahead**, Page 72). He was so successful that the 4-year-old company has posted a profit while other airlines are grounded in debt. Cohen is available for your questions and comments for the next two weeks.



Jeff Cohen, CIO of JetBlue

Find links to the stories mentioned above in the Web Connections box at www.cio.com.

Peer Resources

E-mail the following stories from CIO's online sister publication, Darwinmag.com, to your nontechnology colleagues.

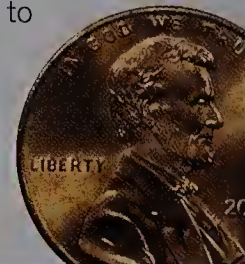
CIO's **Cheap, Cool and Dangerous** (Page 80) talks about the security threats of unauthorized wireless LANs. Darwinmag's **What Is a Wireless LAN?** presents the facts that you need to know.

CIO's **The IT Inside The World's Biggest Company** (Page 64) reveals how technology has helped Wal-Mart get on top. Darwinmag's **Never Stop the Buying** divulges the one thing that Wal-Mart doesn't do right.

Go to www.darwinmag.com or www.cio.com/printlinks.

CIO Budgeting Toolkit

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New in the Research Centers

Get the inside story on emerging technologies—what's the real value, why should you use them, will they really "emerge"?—in CIO Tech Current **Ebb & Flow**. Go to www.cio.com/current.

Our Daily Web

MONDAY Tech Tact Technology Editor Christopher Lindquist covers what's coming.

TUESDAY Alarmed Security experts Sarah D. Scalet and Scott Berinato give you something new to worry about.



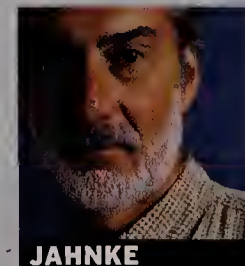
SCALET

WEDNESDAY

Metrics Web Writer Jon Surmacz makes sense of the numbers.

THURSDAY Sound Off Web Editorial Director Art Jahnke opines on ethical dilemmas.

FRIDAY The Big Picture Charts and graphs worth 1,000 words.



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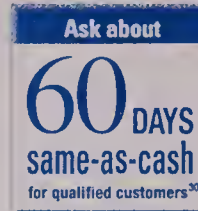
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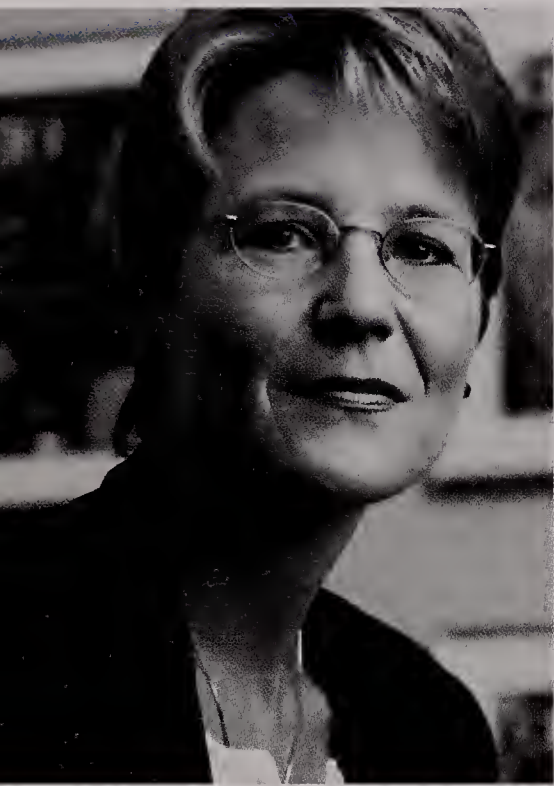
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From the Editor

lundberg@cio.com



Does your company have clearly defined data management guidelines? Would you sign on to our six commandments (see Page 58)?

To cast your vote, go to www.cio.com/readerpoll.

Do the Right Thing

FOR THE PAST DECADE, chief information officers have devoted a great deal of time and attention to the technology part of IT. But as I've said in recent columns, the next decade will see a major shift to the information part of the equation. With the tools in place, companies are getting down to the business of mining, leveraging and making money from all that data they've been collecting.

The technologists have had their day; now it's the marketers' turn. And CIOs everywhere are grappling with the question of their own role in data stewardship.

Of course, before that question gets answered, a more fundamental issue must be addressed: Who actually owns all this information?

"Somehow, technology has led to this rogue theory that acquiring data about people gives you the right to own that data," says Chris Hoofnagle of the Electronic Privacy Information Center (EPIC), in "Take the Pledge," beginning on Page 56. "But there's no theory of property that says that's OK."

Privacy law will inevitably, if not immediately, come down on the side of individuals' right to their own data. For now, however, CIOs are on their own when it comes to figuring out what to do.

The ongoing Andersen/Enron case has brought

the issue of corporate data retention and deletion to center stage. Recent revelations about the FBI's use of e-mail monitoring to investigate Osama bin Laden's terrorist network raise further questions.

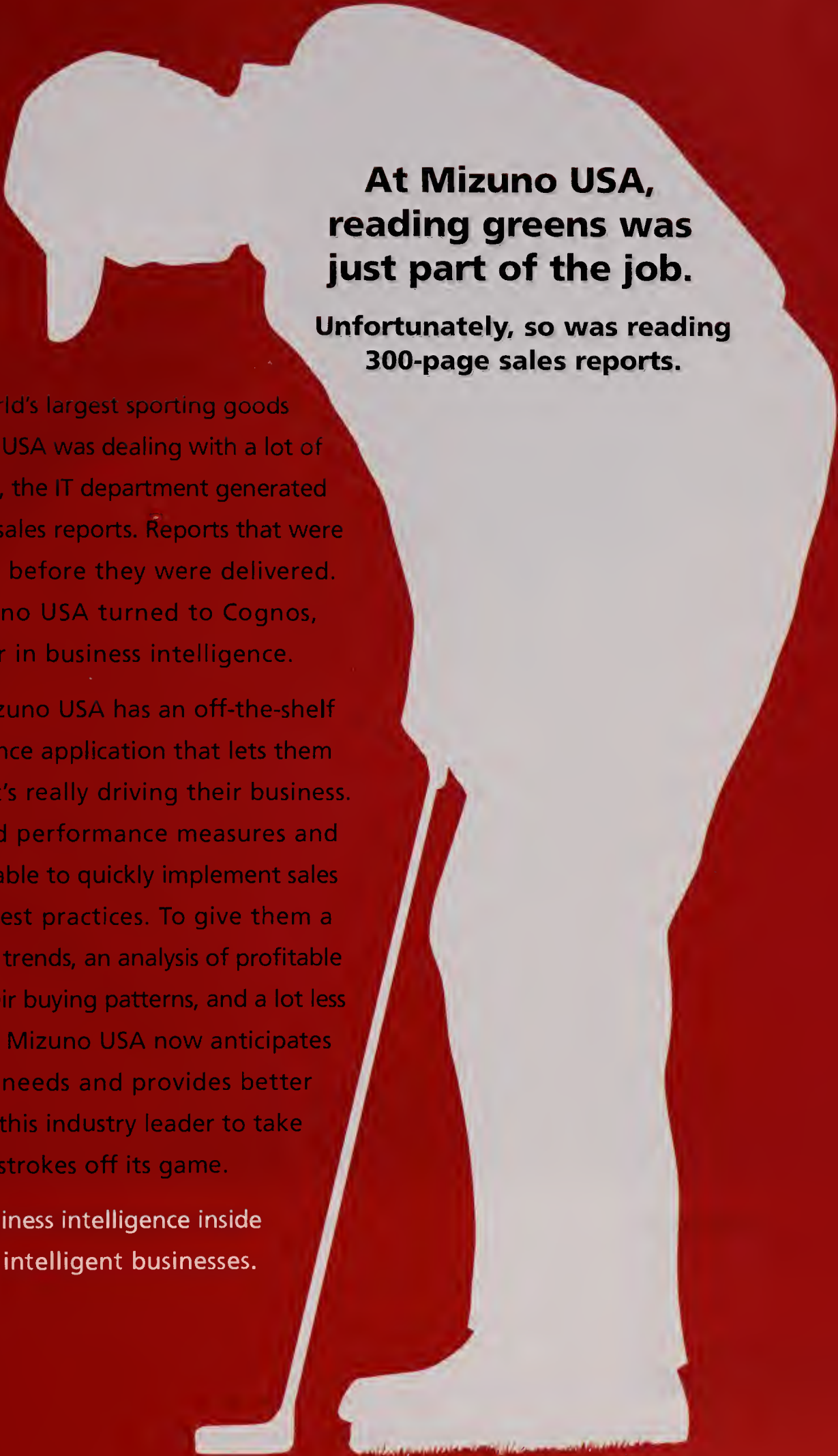
According to an internal FBI memorandum made public in late May, in addition to gathering e-mail from legitimate suspects, the system "also picked up the e-mails of noncovered" individuals. "The FBI technical person was apparently so upset [that the system picked up e-mails it wasn't supposed to] that he destroyed all the e-mail," including those related to the investigation. (View the memo at www.epic.org/privacy/carnivore.)

Data stewardship doesn't stop at document deletion. If a pending privacy bill (S. 2201) gets passed into law, U.S. companies will be required to give customers access to personal information they have collected. Europe already requires such access. It will certainly fall on the CIO's shoulders to figure out how to comply with this mandate without incurring significant new costs.

CIOs can't and shouldn't wait for the law to catch up with the state of the art. You must start the dialogue now regarding what is right, and then deploy the appropriate tools, policies and data management practices to support that stance.

Allie Lundberg

PHOTO BY JASON GROW/SABA



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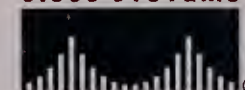
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gbeach@cio.com



The Imperfect Boss

AT A RECENT CIO Perspectives conference, I sat in on an interesting session. On stage, three CIOs debated the topic of reporting relationships. The crux of their discussion: Should a CIO report to the CEO or the CFO?

CIO.com Poll on CEO Types

The category that best represents the CEO at your company:

27% The Hypocrite, who espouses strategic importance of IT but negates belief through personal action.

19% The Believer, who believes IT enables strategic advantage and demonstrates belief through action.

18% The Waverer, who reluctantly accepts strategic importance of IT.

14% The Monarch, who accepts IT is important, appoints the best CIO and steps back.

11% The Agnostic, who concedes IT is important but needs repeated convincing.

8% The Zealot, who is convinced IT is important and equally believes he is an IT expert.

2% The Atheist, who is convinced IT is of little value and publicly espouses this belief.

TOTAL NUMBER OF RESPONDENTS: 159
NUMBERS DO NOT ADD UP TO 100 PERCENT
DUE TO ROUNDING

The consensus seemed to be that it is much better for a CIO to report directly to the CEO (or COO). At companies where the CIO reports to the CEO, information technology is viewed as an investment. No one argued for a reporting relationship to the CFO because—panelists claimed—those companies that have one see IT as a cost to be managed, curtailed or cut.

The argument seems logical. But in my March 1, 2002, column I presented readers with seven creeds of the CEO as a way to characterize how their CEO views IT. (The creeds were originally defined in a *Sloan Management Review* article.) I asked readers to select the category that most represents the CEO at their company and vote on CIO's website. The results (at left) may surprise you. They certainly surprised me.

Well so much for the theory that reporting to the CEO is better than reporting to the CFO.

Leading IT in your company is your responsibility. Take on that responsibility with passion and enthusiasm every day you report to work regardless of whom you call boss.

And thanks to those readers who took the time to vote.

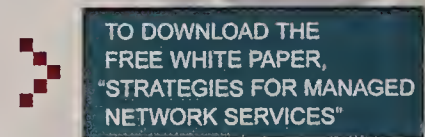
Gary J. Beach

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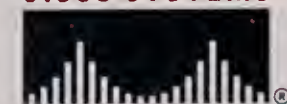
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InBox

Reader Feedback

I.T.'S SOLDIERS

I enjoyed your article ["Leadership Lessons from the Modern Military," Hot Seat, April 15, 2002]. I'm a retired Air Force colonel, now teaching in the university environment. Your article makes several points that I've tried to emphasize over the years. As you correctly noted, right or wrong, we made the distinction of leadership as good and management as not as good. High-caliber leaders have long known that one's ability to energize, motivate and lead people stems from respect, not simply rank.

That is not a new phenomenon. Hopefully, your article will help dispel a few myths.

Gregory D. Freix • *Director of IS • School of Business*
The University of Kansas • Lawrence, Kan. • gfreix@ku.edu

TO SEIZE THE DAY

Your recent editorial ["Where's Morale?" From the Editor, May 1, 2002] touched a nerve.

It has not been business as usual in my IT organization. The slow economy and the events of Sept. 11 have made a noticeable impact. And my colleagues who've shared these experiences have noticed similar patterns in their own environments. For the first time, many of us have a sense of our own mortality. In the daily regime of IT work, this new search for meaning influences project work, human relations and teamwork. I have seen a number of my senior staff come forward, questioning their life's work and priorities. Younger staff members, still years away from the midlife crisis, suddenly feel more vulnerable in the post-9/11 world.

As an IT executive, I have discovered the need to lead in nontechnical frontiers—areas like teamwork and personal development, and in some cases, personal discovery. I have worked hard over these past few months to cultivate that same spirit in my managers. During the course of a typical day, this means that when we introduce projects, we thoroughly explain the business challenges the projects will solve, no matter

who is on the team. The goal is purposeful action. We measure our success by hitting the technical milestones, but also through the feedback we receive from the members of our teams about the teams themselves—because projects don't work when teams don't. If a manager or a staff member has a personal crisis, we look for ways to be supportive. Sometimes this requires understanding beyond the bits and bytes of the business. Finally, we recognize our accountability to each other, no matter what our roles.

Mary Shacklett
VP and CIO
Twin County Credit Union
Olympia, Wash.

RETURN OF THE MAC

I just finished reading Gary Beach's column ["An Apple for the Enterprise," May 1, 2002], and I very much agree with the Linux on Mac approach. The reason I'm writing, however, is to respond to the comment from the IT guys about not being able to put Macs in their Wintel shop. I too work in an NT server environment where 90 percent of the clients are on PCs, but I had used a Powerbook for 85 percent of my work at my desk and when I travel (I'm

an engineer, not a graphics type). I actually started using a Mac one day when we had some type of IS meltdown and I couldn't get support for a couple of days. I plugged the Ethernet connection into an old 7200 that was sitting on a shelf, pulled some network information off my PC, and that was the last time I turned the PC on. I now run OS X (Unix based), with software called Dave (so the rest of the Wintel world and I can share files) and Virtual PC (for those 15 percent applications). I haven't had an IS type in my office in three years (actually, I am now an IS type because I support about 25 other Mac users who have followed my example).

Thanks to Linux and Mac OS, there still is a lot that's new and exciting happening in the world of IS.

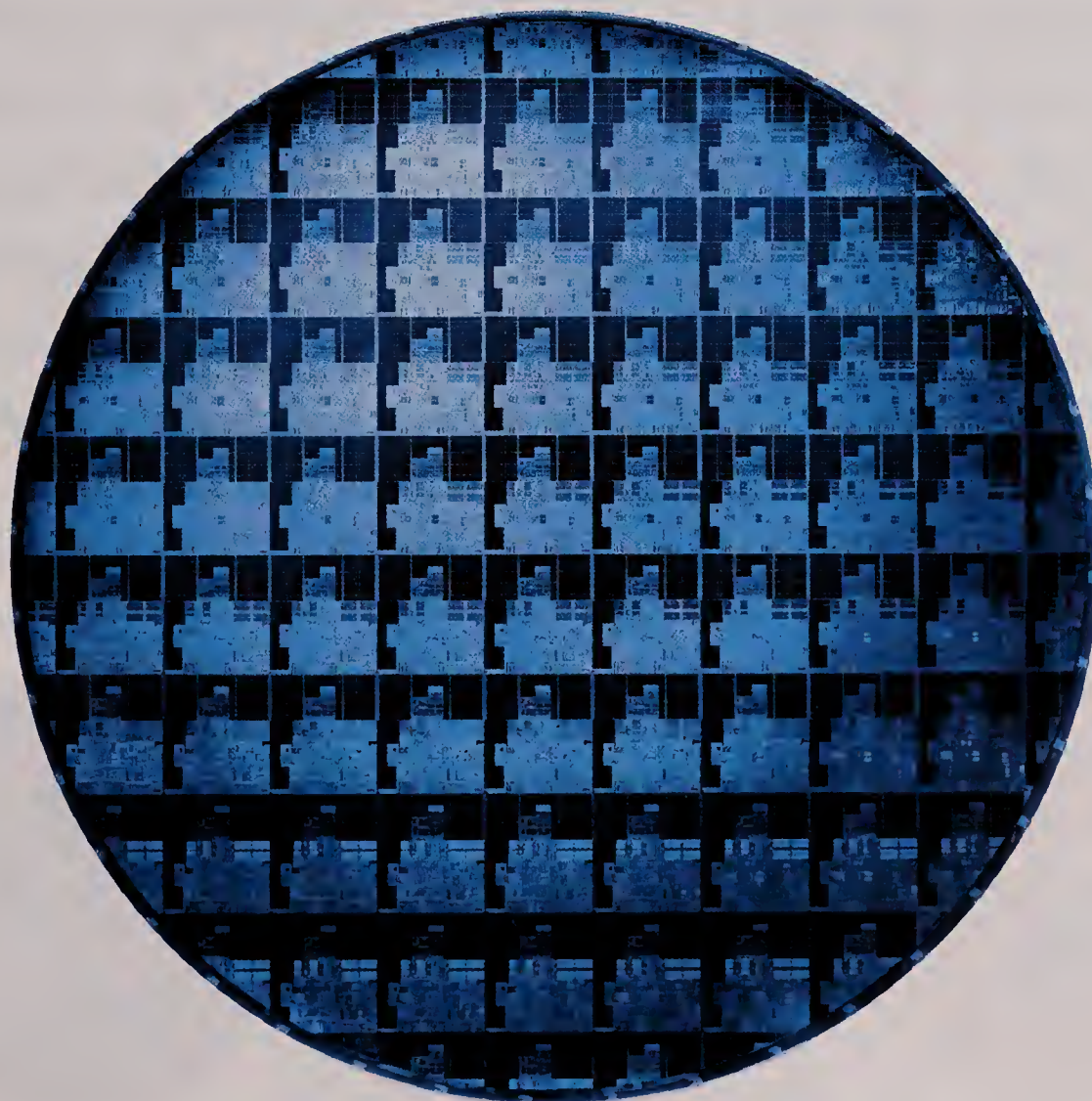
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Send your thoughts and feedback to letters@cio.com. Letters may be edited for length or clarity.



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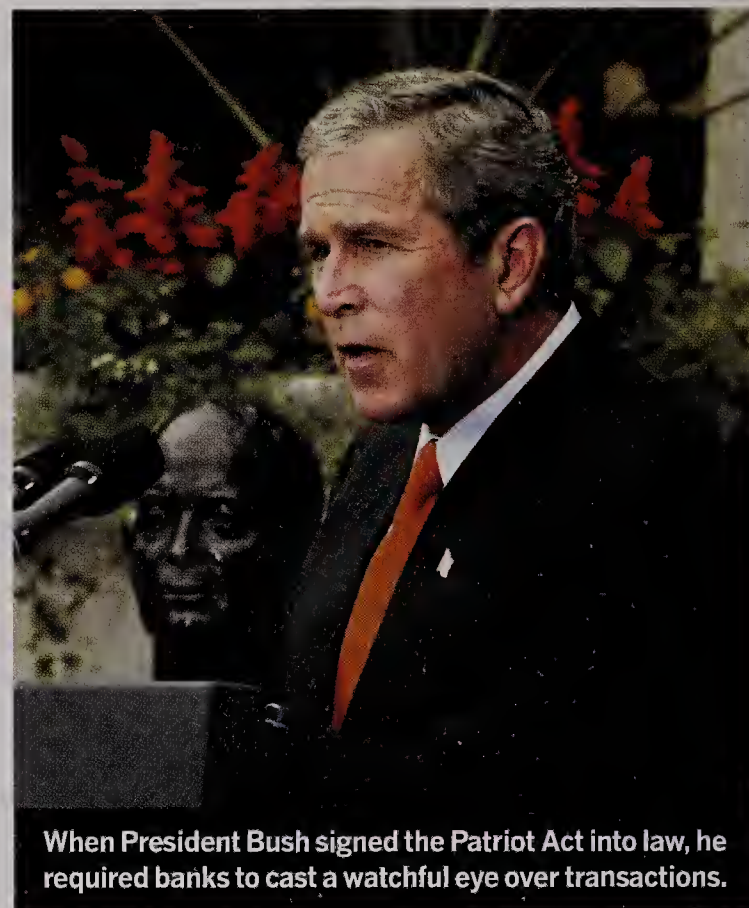
Terror Transactions Bedevil Banks

By Daintry Duffy

BANKS ARE KEEPING a careful eye on the money flowing in and out of their doors. In October 2001, President Bush signed the USA Patriot Act into law, a measure that introduces a new wave of regulations to fight money laundering and organizations funneling funds to terrorist groups. The burdens the new law places on banks and financial institutions are creating a surge of interest in technologies designed to help companies identify potentially suspicious activity. TowerGroup, a financial services research company based in Needham, Mass., estimates the increased demand for anti-money-laundering (AML) technology will extend well into 2003, and that spend-

ing by U.S. banking institutions on such technologies will reach \$60 million this year.

The AML provisions of the Patriot Act do not mandate the use of specific technologies, but banks and other financial institutions would be hard-pressed to obey the new laws without them. Among other things, banks face a greater responsibility to verify customer identity. They must also produce all documentation related to specific accounts within five days of a regulator's request. There's also the complex and crit-



When President Bush signed the Patriot Act into law, he required banks to cast a watchful eye over transactions.

ical task of identifying suspicious transactions that can occur across multiple accounts and over long periods of time, making it difficult for a human to detect any pattern.

The answer for many institutions will involve using intelligent systems, which are based on a variety of tools, for instance, neural networks or behavior detection technologies that take a rules-based approach to examining transactional histories, says Breffni McGuire, a senior analyst in the global payments group at TowerGroup. For example, if a customer routinely sends wire transfers in the amount of \$10,000, and suddenly sends one that is 20 percent greater, the system might flag it for investigation. Another example of a red flag transaction would be numerous little deposits—

Continued on Page 30

Does Biometrics Work? We'll Soon Find Out

SOFTWARE DESIGNED TO root out bad guys by analyzing a person's face has generated controversy over its possible impact on individual privacy rights. As part of the antiterrorism Patriot Act, the government is going to find out this summer whether there's anything for civil libertarians to worry about it. The National Institute of Standards and Technology (NIST) in Gaithersburg, Md., is inviting software vendors (there are

about 70) to participate in the tests. Government scientists will use the software to analyze still images to see how many false positives show up, says spokesman Philip Bulman. The testing bed: 6 million still images provided by the State Department.

NIST is slated to tell Congress in October which biometrics products, if any, work as advertised.

—Michael Goldberg



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Terror Transactions

Continued from Page 28

small enough to fall under investigative limits—followed by an \$80,000 withdrawal.

While AML legislation has been in place for years, it has never affected so many institutions or been taken so seriously by the financial services industry, which now faces increased federal scrutiny as well as a watchful public. Companies that don't comply could face fines of up to \$1 million, says McGuire, as well as significant damage to their reputation. "There has been a real sea change since Sept. 11 in the seriousness with which organizations are taking this issue," she says. "There's much greater awareness and heightened scrutiny around how companies will comply."

The United States of E-Commerce

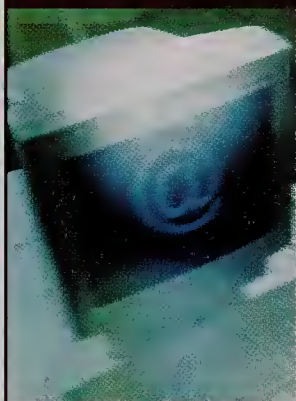
WHAT STATE IS THE BEST for e-commerce? The Progressive Policy Institute (www.ppionline.org) scored the 50 states (and Washington, D.C.) according to what a citizen can buy online (such as wine, cars, insurance and contact lenses), whether the state allows digital signatures (good for e-biz) or whether it imposes online taxes (not good). In number-one Oregon, for example, residents can order prescription drugs online without paying sales taxes. Conversely, South Carolina, which ranked last, doesn't allow the online purchase of contact lenses and is one of 13 states that has not passed a law recognizing digital signatures.

Here's the ranking of the top 10 for e-commerce:

1. Oregon
2. Utah
3. Indiana
4. Louisiana
5. Iowa
6. Alaska
7. Hawaii
8. Idaho
9. Michigan
10. Colorado

SOURCE: PROGRESSIVE POLICY INSTITUTE, MARCH 2002

HOT TOPIC



E-BUSINESS

Making B2B Pay: Four Tips *By Michael Goldberg*

WHEN MANAGERS at the Federal Home Loan Bank of Dallas decided to automate some customer transactions nine years ago, they didn't call it B2B e-commerce. Nancy Parker, senior vice president and CIO, and her team developed an application to let customers—

small to midsize banks—automate wire transfers for cash advances. The Internet became the medium, and the program's success yielded some quick lessons.

The bank further developed its program, SecureConnect, to include financial status reports and updated interest rate quotes. Customers, using encrypted passwords, get confirmation of their transactions and account updates in real-time.

The results: Since SecureConnect debuted in 1997, the bank's loan portfolio has grown from \$9 billion to \$32.3 billion as of the end of 2001. Into April, 95.6 percent of the bank's transactions traveled through SecureConnect. Sixty-three percent of the bank's 841 member institutions participate. Meanwhile, the bank's five-member lending staff has remained constant.

How did they get such a high participation level? Parker and Sonia Brown, a senior vice president at the Dallas bank, offer these observations:

1 Show up at the door. Over a three-year period, Federal Home Loan Bank sent a team of IS and other staff to visit customer banks in Arkansas, Louisiana, Mississippi, New Mexico and Texas. The bank provided training, software and networking equipment if necessary—all free of charge. Every site was different and required a different level of support.

2 Pay a lot for security. Without disclosing how much Federal Home Loan paid, Parker adds that "we certainly did not spare the cost of making sure the security was as high as it could be." What is clear is that the security measures have to be easy enough for a PC novice to use but strong enough to handle transactions worth millions of dollars every day.

3 Don't use "Internet time." While the Dallas bank was an Internet early adopter, the business pursued SecureConnect as a long-term strategy. It took about four years between the decision to create SecureConnect and its rollout.

4 Offer price breaks. SecureConnect users get a lower interest rate on loans—as much as one-tenth of an interest point. For customers processing hundreds of transactions a day, that can add up.

SecureConnect is a godsend for its timely information and lower loan rates, says Jon Hitchcock, president of Pioneer Bank, a \$371 million bank in Roswell, N.M. And although his bank lacks a big technology staff, the Federal Home Loan Bank staff came to Roswell and "loaded the system, and before we even had broadband Internet access they hooked up a router to our network."

"We told KPMG Consulting: Texans should do government business online, not in line."



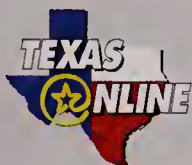
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Chief Information Officer, State of Texas*

*Gary Miglicco
Managing Director, Public Services, KPMG Consulting*

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BUSINESS SYSTEMS: STRATEGY IMPLEMENTATION RESULTS

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By the Numbers

By Lorraine Cosgrove Ware

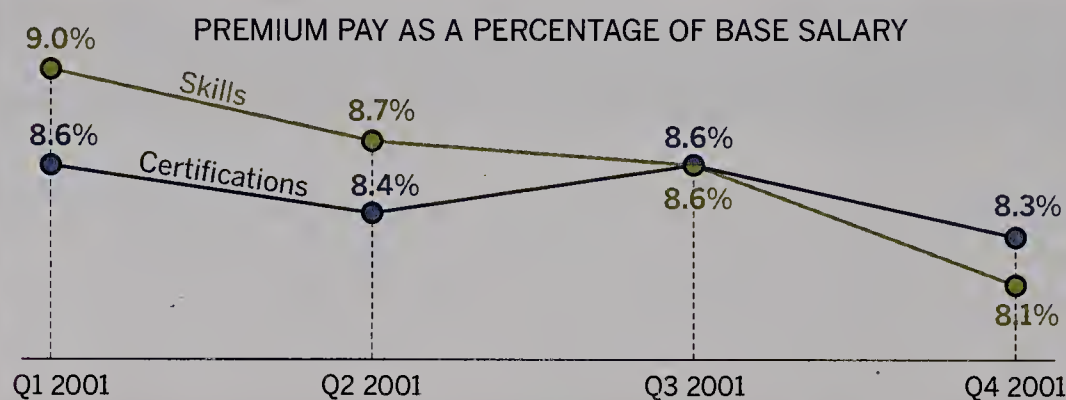
Get a Return on Your IT Staff Certification Investments

COMPANIES ARE PAYING higher bonuses to IT staff who are certified in security, database management and project management than to IT staff with standalone skills, according to a survey conducted by New Canaan, Conn.-based research and advisory company Foote Partners. Premium or bonus pay for those certifications increased from 12 percent to 18 percent from the fourth quarter of 2000 to the fourth quarter of 2001, with a 4 percent increase in bonus pay for certifications overall in the same time period. And employers are more

apt to pay for certification training than they were two or three years ago. "CIOs believe that certifications demonstrate a greater commitment to job and career, and show initiative on the part of the employee," adds David Foote, president of Foote Partners. "Those employees are a safer bet in economic downturns, when CIOs are under pressure to justify IT dollars spent." But it's important to consider your skilled IT staff and to understand which certifications will benefit your company to ensure that your dollar is well spent.

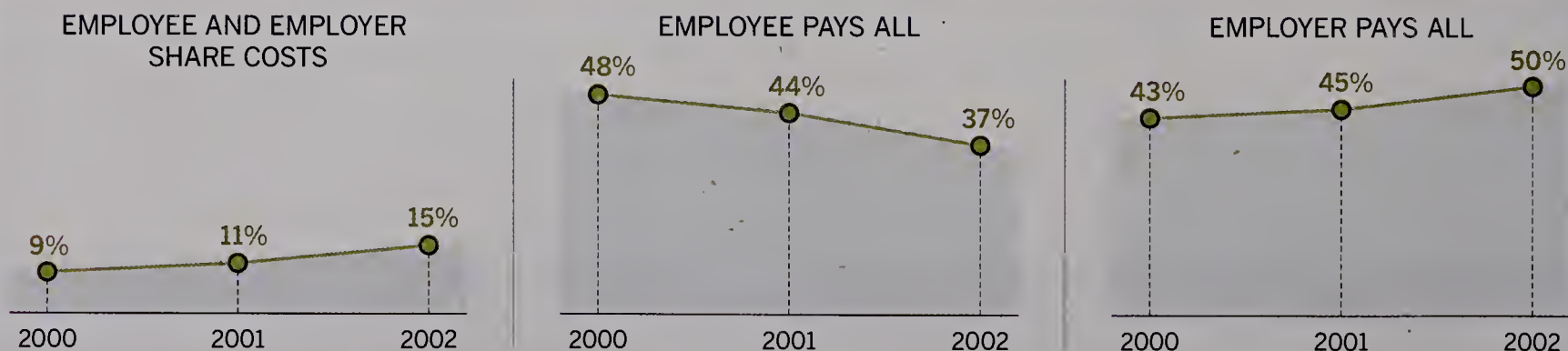
CIOs Are Rewarding Certified Employees...

Bonus pay for certifications pulls ahead of compensation for standalone skills



...And They Are Paying for Certifications

Employers are increasingly picking up the entire tab to certify their employees. Make sure you get your money's worth.



SOURCE: "2002 TREND REPORT: TECHNICAL SKILLS AND CERTIFICATION PAY, NORTH AMERICA & EUROPE," FOOTE PARTNERS, 29,100 I.T. WORKERS IN 1,810 COMPANIES SURVEYED.

Best Practices

Don't assess your staffing needs on certifications alone. Remember, experience counts. Certification programs are more prevalent for infrastructure issues like networking and database systems and are less prevalent in areas like application development. "IT employees with years of experience versus certifications can approach problems more creatively," says David Foote, president of Foote Partners. "CIOs need free-thinking gun-slingers on board too."

Encourage staff to get IT certifications that include a project management component, such as Novell Project Plus. Employees with those skills can help you improve process. Project management also teaches process documentation and knowledge sharing, which will help CIOs keep expertise in-house.

Identify the areas in IT that warrant certification. "Security is a board-level issue that can impact your ability to form partnerships, your competitiveness and your stock price," Foote adds. CIOs need to make the business argument for resources and IT staff with specific security certifications such as forensics and intrusion detection.



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DATA ANALYSIS

Busting Crime by Decoding Phone Bills

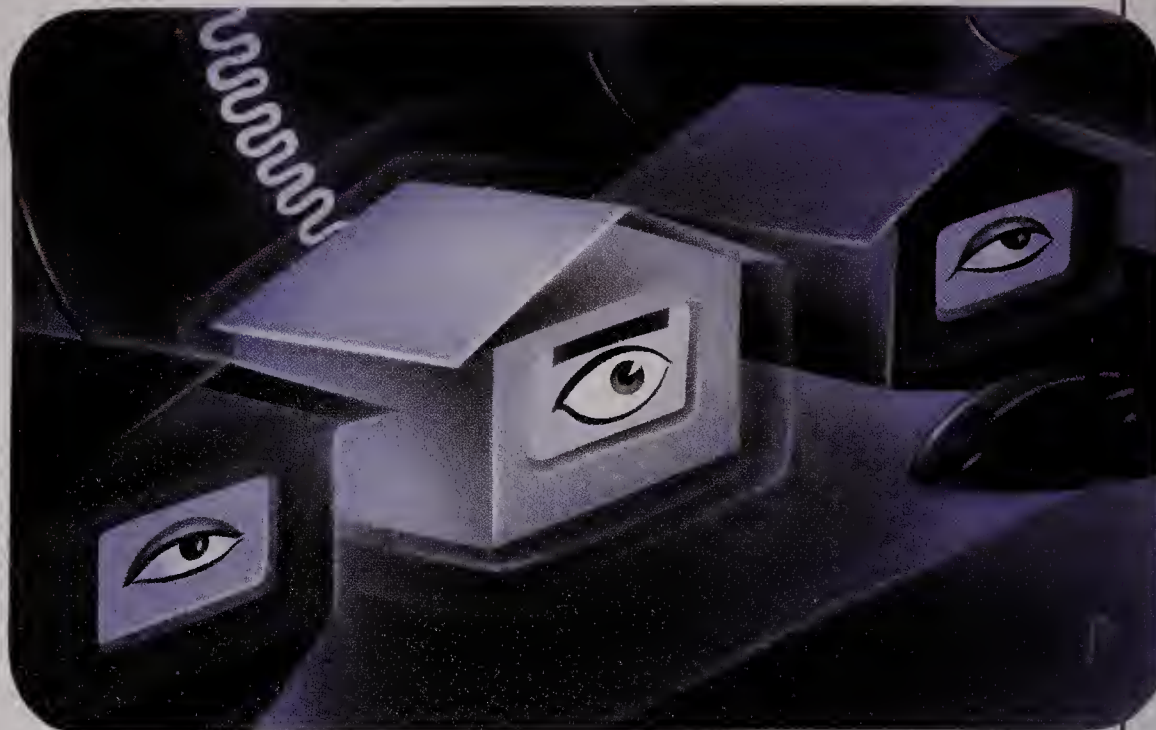
By Todd Datz

GABBY CRIMINALS BEWARE: There's a new technology out there to help the good guys catch you.

PatternTracer TCA, telephone call analysis software from Springfield, Va.-based i2, helps law enforcement agencies decipher complex relationships buried in billing records. The software identifies repetitive groups of calls to help establish patterns linking, for example, Butch the jewel thief, Lefty the safe-cracker and Wanda the getaway driver.

Pattern relationships are presented as a link analysis diagram using icons to connect the different callers and create a time-line chart so law enforcement agents can view patterns over time. The software can run up to 100,000 telephone records at a time.

The system is intended to replace the manual process that law enforcement uses today, which typically involves analysts painstakingly combing through large volumes of printouts or staring at Excel spreadsheets for hours on end. Humans sometimes miss the subtle patterns picked up by the software's proprietary algorithm.



Also, patterns can be identified in minutes instead of hours, freeing up valuable investigative time for the gumshoes.

Future iterations of the technology will be applied to other areas, such as financial analysis to detect money laundering activity and Internet traffic analysis, which could help detect hackers or other illegal activity, says Todd Drake, national sales manager at i2. Customers include the FBI, the National Center for Missing and Exploited Children, and the U.S. Postal Inspection Service, though Drake claims ignorance when asked how those organizations use the software. "More often than not we don't know what they're doing with the product," he says.

THE WEB

Calling All Strangers

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Those phone numbers came from the Payphone Project (www.payphone-project.com), a website that catalogs pay phone numbers from around the world. You can reach out and touch people passing by any number of

interesting phone booths, from the two Telecom New Zealand telephones in Antarctica's McMurdo Station to the pay phone at the top of the Eiffel Tower in Paris.

Mark A. Thomas started the Payphone Project on a whim in 1995. He first collected numbers from friends and then from visitors to the site. He has now amassed a database with thousands of pay phone numbers. "By listing pay phone numbers, I invited people to pick up the phone and call to see who answered and maybe have a laugh," says Thomas, a classical pianist living in New York City.

Payphone-project.com probably has this number in Iceland.



Thomas first realized how popular his site had become while walking through Queens. "I answered a ringing pay phone at the 36th Ave. subway station in Astoria, and the caller said he found the number for that phone at the website," Thomas recalls. "I didn't tell him it was my website, though. I didn't think he'd believe me."

—Stephanie Overby

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On the Move

Compiled by
Meridith Levinson

Kmart Looks Within for CIO

KAREN AUSTIN was driving home from work in April when she heard the chime of her cell phone. "Hello?" she answered.

It was Julian Day, president and COO of beleaguered discount retailer Kmart in Troy, Mich. "We've made our decision," said Day. "It's unanimous. We want you to be our CIO."

Austin had applied for the senior vice president and CIO post that had been vacant since last August. She was thrilled with Day's news.

"Awesome!" she responded. This was the outcome that the company's former vice president of application development had hoped for. "I've been here [with Kmart] 18 years. I've had a vast amount of experience in IT and in interfacing with the business. I felt like I was the most qualified person for the position," she says.

Still, there was some small part of her psyche that was nervous. The phrase "Be careful what you ask for, you just might get it" gnawed at the back of her mind. After all, the 40-year-old Austin is assuming the top IT job at a company caught in the throes of bankruptcy. Five others have held the CIO post since 1994. Using IT to resuscitate the ailing retailer should be about as easy as sailing across the Atlantic in a row boat.

"Doing what we need to do while in Chapter 11 and while controlling costs is a big challenge," she says. "We're making sure we're working on projects that support the business. We've stopped some projects and accelerated others."

Solidifying infrastructure is Austin's most critical issue. Last February, the company combined its core hard-line and soft-line systems. Austin says consolidating those systems will eliminate overhead, shorten lead times and simplify store and distribution center operations. Now she has to make sure this consolidated core system is solid enough to carry the company

through its recovery from bankruptcy and into future growth.

Equally important are technology initiatives she's sponsoring to ensure that prices match from shelf to register and to prevent stock-outs. "These are all things that help us decrease costs, improve comparative sales and increase our return on assets," she says.

When asked if she's worried about meeting the same fate as those other short-lived CIOs, she says, "Not with my history. I made a commitment on day one. I held a pep rally in the cafeteria for the entire IT group, and I said, 'I am here to stay, and I am committed to doing what it takes to make sure IT helps the company emerge from bankruptcy.'"



Karen Austin: Kmart's sixth CIO since 1994

News of Other Moves

Ruth Bruch has been named senior vice president and CIO of Lucent Technologies in Murray Hill, N.J. As CIO, Bruch will focus on reengineering the company's information systems and completing an SAP implementation. She joins Lucent from Visteon, where she served as vice president and CIO.

Beth Perlman joins Baltimore-based Constellation Energy Group as vice president and CIO. Perlman, former vice president of Enron Wholesale Trading Technology, will report to senior vice president and CFO E. Follin Smith.

Tsvi Gal, the former president of ATT.com, joins New York City-based Warner Music as senior vice president and CIO. Gal will supervise the integration of Warner Music's global IT operations and will look for opportunities to leverage IT synergies with the parent company, AOL Time Warner.

Lucia Ahnemann leaves the CIO role to join global ERP vendor Adonix as vice president of marketing and channels. She spent two years at consultancy Scient as CIO.

Paul Volkman has been promoted to CIO of Vivendi Universal Games in Los Angeles. The company's former director of information technology, Volkman will be responsible for developing information technology strategy and overseeing the company's infrastructure and applications.

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SECURITY TECHNOLOGY

Stop That Cart!

By Stephanie Overby

EVERY 90 SECONDS, a shopping cart is stolen somewhere in the United States. That statistic is a nightmare for grocery retailers. Missing carriages (which cost between \$75 and \$100 apiece) represent big losses for



supermarkets—more than \$800 million a year. Abandoned cart liability and nuisance complaints have led to hefty fines for some retailers, while others have had to invest in carriage retrieval services to track down carts that have gone MIA.

Some supermarkets have taken matters into their own hands, installing cart-retention devices on their carriages that literally stop shopping-cart thieves in their tracks. The Cart Anti-theft Protection System (CAPS) from San Diego-based Cartronics includes custom electronic shopping cart wheels that

incorporate a digital receiver and replaces one of a cart's standard casters with a braking device. CAPS also includes a radio frequency transmitter and an antenna buried around the perimeter of the retailer's property. That transmitter generates a signal along the antenna line. When a cart rolls too near the line, the caster's receiver intercepts the signal and a brake is released that rolls under the wheel to stop the cart. The K-2000, from Sacramento, Calif.-based Kart Saver, uses an infrared-driven system that includes a device attached to the left front wheel of the cart that sounds an alarm and causes the carriage to go in circles when a customer exceeds a preset distance from the store.

Harold Slawsby, who owns two Save-A-Lot grocery stores in Massachusetts, installed the Kart Saver system in spring 2001 in his Boston location, which had been losing about 10 carts a week. He spent \$18,000 to equip 135 carts and says the system has already paid for itself. "Before, we had to pay to send out a carriage retrieval service six days a week to cruise the area and look for our carts. It wasn't just that they'd disappear for good; sometimes, they were just missing when you needed them, or they'd incur damage when they were out," says

Slawsby, adding that the carriage retrieval service now goes out only twice a week, and he's lost only about 18 carts since installing the system a year ago. "You're never going to be able to stop someone who really wants to take a cart," he admits, "but at least they've got to put in some extra effort now."

TECHNOLOGY RECYCLING

Unmerging Technology

IS YOUR COMPUTER OUTDATED? Do you care about the environment? Are you community conscious? Do you live on the West Coast? If you answered "yes" to any of the above, check out www.freegeek.org.

Free Geek, a nonprofit organization based in Portland, Ore., takes donated used computers, refurbishes them and provides them to area residents in exchange for community service. The renovated systems, called Freek Boxes, are loaded with a GNU/Linux operating system.

Free Geek accepts any hardware, working or not, although it asks for a \$10 donation to accept monitors. It then refurbishes or recycles the equipment. Free Geek has recycled more than 16,000 pieces of equipment, refurbished and donated more than 875 computers, and logged more than 20,000 hours of community service.

Not just anyone can waltz in and take home a computer. To get a Freek Box or a refurbished printer, one must be willing to volunteer for between 24 and 72 hours of community service, doing things like fixing or taking apart equipment, coordinating donations and teaching.

—Simone Kaplan

This Date in IT History: JULY 1-15

1752 French silk weaver Joseph Marie Jacquard, who perfected a loom that used punch cards to program weaving patterns (including the eponymous jacquard weave), is born **July 7** in Lyons.

1890 The U.S. Census Bureau on **July 1** introduces mechanical calculating devices. Invented by Herman Hollerith, they count the holes field workers punch in cards.

1951 William Shockley of Bell Telephone

Labs on **July 5** announces the invention of the junction transistor.

1985 Microsoft releases the first version of Windows on **July 2**.

1991 Apple and IBM on **July 3** sign a pact to develop an operating system for the RISC processor. This leads to the PowerPC.

1994 *Telstar 1*, the first commercial communications satellite, is launched **July 10** from Cape Canaveral, Fla.

1995 IBM announces its 1995 plan to take over Lotus Development Corp. on **July 5**. The \$3.5 billion deal was the largest to date.

1997 Web surfers view first-ever photos from Mars transmitted on **July 4** by the Sojourner robot, part of the unmanned Mars *Pathfinder* spacecraft.

SOURCES: THE HISTORY CHANNEL WEBSITE (WWW.HISTORYCHANNEL.COM), WWW.COMPUTER.ORG

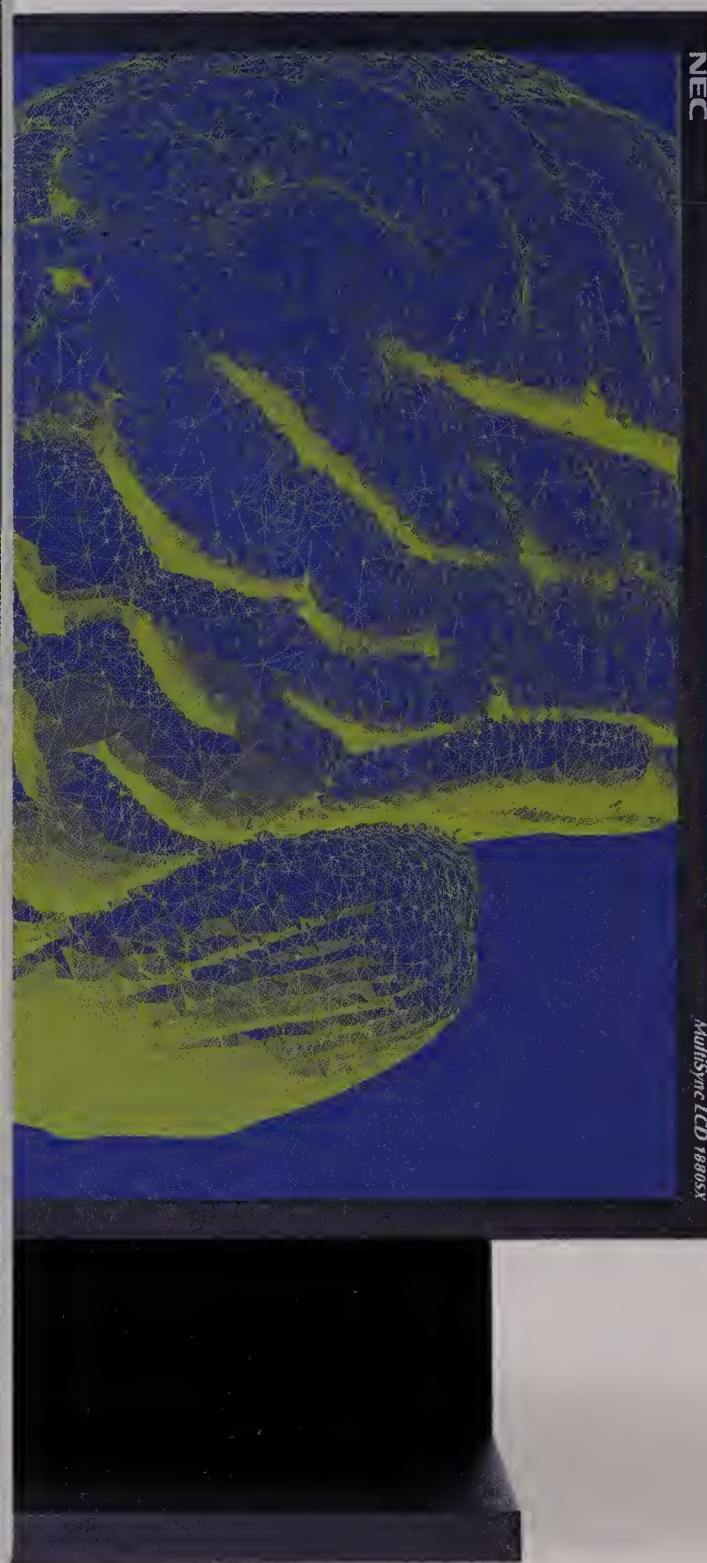
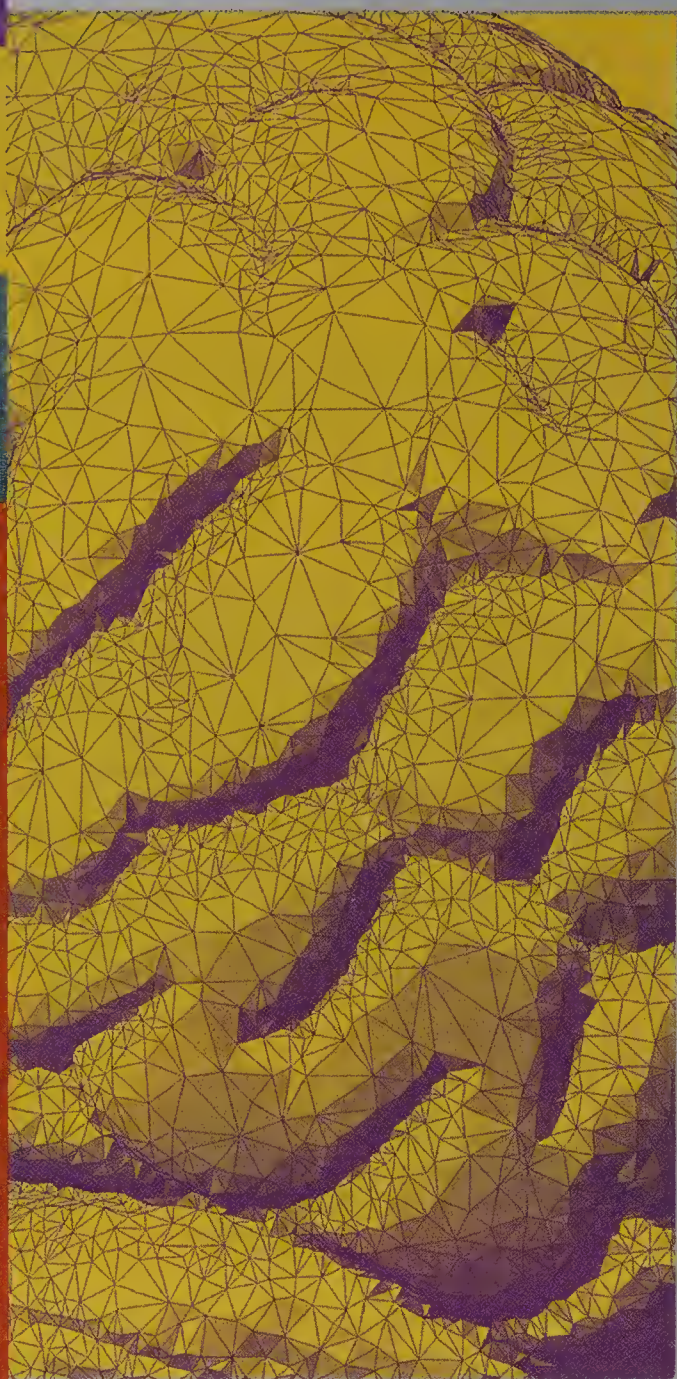


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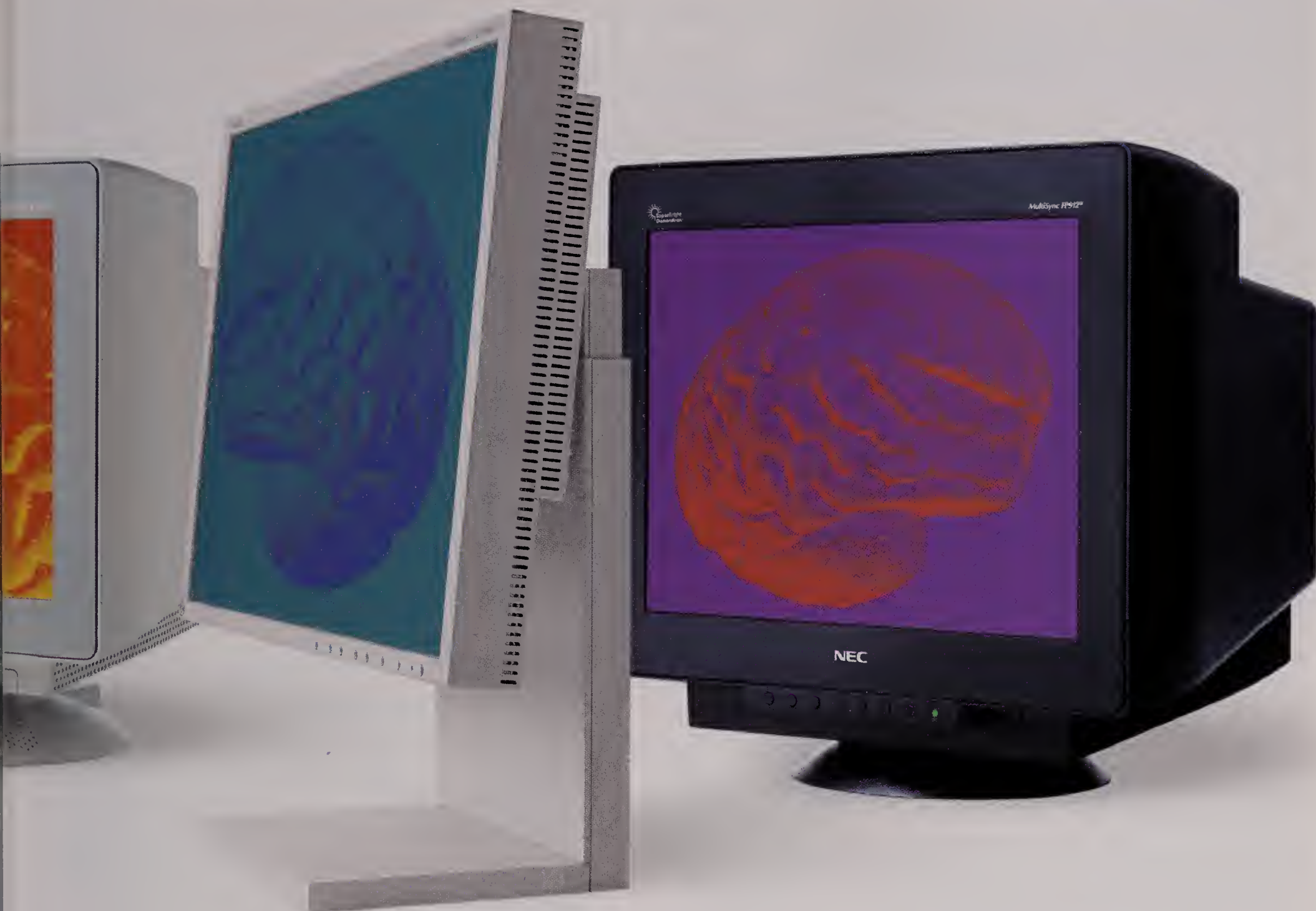
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Total Leadership

How Does Your Workforce Grow?

Effective leadership requires equal parts of long-range planning and regular pruning

BY CHRISTOPHER HOENIG

GARDENERS CONSTANTLY DO three things: pick the best quality seeds, prune regularly to keep the plants shapely and healthy, and spend hours preventing pests and then treating the plants for any damage sustained. Those same three things should dominate any leader's approach to people management and staffing, whether on the small scale of a team or through a worldwide performance management system.

Seeding the Staff

In organizational leadership, the equivalent of seed for your garden is the behaviors and values of your people. That vision must be clear and ultimately linked to strongly held values and specific behaviors. If you have a fuzzy vision or weakly held values, your organization can grow—but it will not have the health and productivity you intend.

Vision starts at the very beginning of the hiring process. Ask yourself the question, Can this person become a leader in the organization? It doesn't matter whether you're hiring functional specialists or line employees. At McKinsey & Co., where I was involved in recruiting and hiring for several years, we always



asked the question—even about the youngest associates—Can we envision him as a partner? More often than not, it was that question that either distinguished a candidate or sunk him.

If you can find and bring in the best, then use consistent principles in developing them. At my current employer, the federal General Accounting Office, the leadership team has three core values: accountability, integrity and reliability. They are so deeply held within the organization that, one way or another, they influence key hiring decisions.

Be sure to concentrate on specific behaviors that you want to encourage. Specificity and consistency inspire hope, investment in self-development and healthy expectations. In contrast, there is nothing more damaging than an attempt to create leaders that is vague and inconsistently applied. It breeds cynicism, miscommunication and destructive competition. I have worked in organizations where this consistency

ILLUSTRATION BY TIM COOK

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Prune for Shape

You need not only a vision of your ideal employee but also of your ideal organization. Specify the right skill and knowledge mixes that will add up to a well-shaped company. Then make sure other leaders in the organization understand the shape as well, because more than one person will be pruning at once. Above all, know how the target shape relates to your overall strategy. I've seen countless staff development systems that seem completely disconnected from business purpose.

I've been consistently awestruck by how damaging one bad employee can be. Every leader I've ever met has a secret name for these employees: "bad apple," "black hole," "cancerous."

A leader's worst enemy is a performance management system that cannot differentiate employee performance. Whether you're starting a new organization or leading an old one, pruning the staff is a chore that must be adhered to religiously to avoid trouble. In a small organization, where every person takes on huge importance, it can feel like lopping off a vital branch. Whereas in a large organization, with its interlocking networks, the difficulty is avoiding inconsistency or whole areas of neglect that can damage organizational health. The key with pruning is to be regular, consistent and precise. Once you've decided how you want your company to grow, do not shrink from cutting off branches that are going in the wrong direction. That means you have lost the ability to shape your organization's destiny.

To know what to trim and what to grow, you need information. Information on performance is valuable only if there is true dispersion and separation in ratings and evaluations of people's performance. Avoid grade inflation; force distributions, and use that information for your decisions. Don't trust your own systems to verify this point—have outside organizations come in and test your system. Otherwise, you'll never really know.

When you find a performance problem with one of your people, either heal it, cut it off or let it fall away, but don't ignore it. Keep trimming and shaping at every performance cycle. Move closer and closer to your ideal shape. Many leaders get caught in the trap of discussing individuals or units in the performance cycle instead of consistently asking the question, How much closer are we to our target shape?

Pest Prevention

As a leader, I've been consistently awestruck by how damaging one bad employee can be. Every leader I've ever met has a secret name for these employees: "bad apple," "black hole," "cancerous." These people have an insidious and disproportionately negative impact on an organization, but getting rid of them is not easy. The best way to avoid bad employees is a tough screening process. Best practices include multiple interviews, diligent reference and background checks, group decision making, and comparing multiple applicants for every job. I think that having probation periods for key positions is a good idea. After a set time, everyone—the organization and the employee—can reevaluate.

If you think you might have made a mistake in hiring, you probably have. Don't question your intuition—you'll just lose time, money and probably end up with a lawsuit. Hiring mistakes need to be dealt with immediately. I've experienced the pain of waiting too long to deal with a problem employee because

there always seemed to be a reason to wait. But the opportunity cost, especially for key positions in small companies, can be astronomically high.

If you run an organization or take over one, then your immediate and regular task is to look for employees gone bad. They're usually easily identified if you actively look for them. The process of culling them while keeping the organization running takes a lot of discipline over many months. It's hard work to maintain fairness while avoiding poor morale and lawsuits. But you'll soon be able to measure your success by the increase in job satisfaction and productivity of your other employees. They'll take great heart from seeing your courage to deal with a problem they've had to live with every day.

So even though it might not fit your image of yourself as a leader, develop that green thumb. You won't regret it, as over the space of a few years your organization begins to take on the shape of a well-tended garden. And you'll find other people recognizing your efforts and wanting to take a look and even stay awhile. **CIO**

What's your approach to organizational leadership? Let us know at leadership@cio.com. Christopher Hoenig has been an entrepreneur (CEO of Exolve), consultant (McKinsey & Co.) and inventor, and is the author of *The Problem Solving Journey: Your Guide to Making Decisions and Getting Results* (Perseus Publishing, 2000). He is now director of strategic issues for the General Accounting Office.



PHOTO BY KATHERINE LAMBERT



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CIO Observer

Viewing the World Without Spin

On Assignment

In which our intrepid reporter gets a glimpse inside the wooly world of trade journalism

BY JERRY GREGOIRE

I HATE LEARNING THINGS the hard way. It hurts! That I always expect things to go smoothly must be somehow hardwired into my inner bumpkin. I think the best thing you could say about my guardian angel—that habitual no-show who's supposed to, at the very least, guard my dignity—is that she's an underachiever.

I had this perfectly terrific idea that I'd attend the user conference of a major software vendor and write a column from the point of view of those responsible for putting the conference together. Events of this size are complex and require flawless systems-implementation-size planning and execution. I thought it might be interesting, for a change, to see the event through the eyes of those responsible for making sure the material was relevant, the venue and facilities were attractive, the events and buses ran on time, the food was hot and the beer cold. I selected CA World over the other large conferences for no other reason than it occurred early enough for me to make the July issue deadline.

Some months before the event, I spoke to my CA contact in the press relations department (let's call him Fred) and explained (rather poorly, it turns out) my idea for the column.

I was assured that I'd have access to the right folks. About a week before the event, I got a call from Fred telling me that a single interview had been arranged with an executive vice president whose department coordinates the conference.

"OK?" Fred asked.

Now here's where the learning part happens.

I'm pretty sure that veteran columnists would have said, "Sure Fred, that's great," and then gone to the conference to surreptitiously find and interview whomever they needed to get the information. But not me. Oh, no, not this rookie.

"No, Fred," I answered. "I don't want to speak to a pre-programmed senior executive. I want to speak with the folks in the trenches, the ones doing the work."

Wrong answer.

The dialogue that ensued was too lengthy and embarrassing to play back for you here, but it involved an escalating



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series of threats, including revoking my press credentials and making urgent phone calls to the magazine's headquarters. This was followed by a string of conciliatory calls offering clarification and assurances of cooperation. Confusing to say the least. I headed for the conference not completely sure I'd be let in.

The scene reminds me of a car dealership, where nervous and financially overextended buyers wait isolated while the salesman pretends to go talk to his manager.

CA World was held in Orlando, Fla., this year and will be in Las Vegas next year. The attraction of these cities, of course, is the attractions (Mickey Mouse, Elvis impersonators) and great facilities like the Orange County Convention Center. CA appears to have taken over all 1.4 million square feet of meeting and exhibition space. The press packet mentions that there is 380,000 square feet of carpet used at the conference, a notable statistic, I suppose, because the carpet is patterned with CA's logo. Everything the attendees see is first-rate, slick and color coordinated. During the course of four days, the press packet boasts, 10,000 attendees have access to 842 education and information sessions, special events including a keynote address by former New York City Mayor Rudy Giuliani, and hundreds of product exhibits by CA and its partners.

On the Scene

One aspect of the event that I find particularly fascinating is the Customer Value Corner, an area sectioned off with a couple dozen cubicles for private meetings between customers and their CA account reps. The scene reminds me of a car dealership, where nervous and financially overextended buyers wait isolated while the salesman pretends to go talk to his manager. The CIOs that agree to meetings in the Customer Value Corner apparently haven't heard the rule, "Never negotiate a contract on the other guy's home turf." Abandon all hope, ye who enter here.

Another area is reserved for the conference's most, shall we say, "looked after" guests and is aggressively defended by security guards to make sure the average attendee doesn't accidentally wander in. It's an expansive arrangement of comfortable lounge furniture, fresh flowers, long buffet tables of perpetually stocked free food and beverages, a thoughtfully outfitted

work area with workstations, network connections, phones, fax machines and copiers, and plenty of friendly CA folks standing by to offer assistance. You guessed it, it's the Press Center.

The Press Center is an inner sanctum divided into four sections: a work area, a dining area, two rows of glassed-in interview rooms, and a large theater for press conferences. That

the press conferences are held in an area out of sight of the average attendee is interesting, in that there is no opportunity for the press to hear questions (like "so what?") that a customer might ask. In any case, the press can eat, drink, snooze, gather, write and file their stories without ever leaving the cloister or mixing with the attendees (although that is certainly allowed).

At the core of this largesse is CA's considerable investment of time, money and effort to polish its image. Some customers I talked to said it's working and some aren't so sure, but those of us who remember dealing with CA 10 or 15 years ago can attest to the fact that the company's image definitely needed work.

The Inside Scoop

We Dubya Bush Texas Republicans have long suspected press bias and the manipulation and filtering of information when the subject is political or social. But readers of technology magazines should consider that the large IT vendors that magazines write about are also their advertisers and largest source of income, no small matter in these times of declining ad revenue. The symbiosis (or parasitism) between writers and the industries they cover can be fraught with contradiction. A lack of access to senior executives can make you an ineffective writer. An unfavorable story can mean no access the next time you need it. Making a press relations person angry can have the same effect. That, in essence, was the gist of Fred's threats.

In what, I guess, was supposed to be a compromise, I was given 40 minutes to interview the executive VP's second in command, Bob Millin. Bob is not exactly in the trenches, but he's certainly more hands on than his boss. Bob is a friendly, energetic guy who really seems to love his job. During our time in the little glass cube, a PR person (not Fred) sat and scribbled notes as fast as she could. Occasionally, Bob would shoot a self-conscious glance her way for a signal that it was OK to answer one of my questions, and occasionally she would interrupt and ask Bob to elaborate on something or tell a particular story that she, evidently, thought I needed to know. When we were done, I asked if it was normal to have a PR person in attendance at these interviews. In all of my time at Pepsi Cola and Dell, I can't ever remember having one of our PR folks sitting in. As we walked out of our cube, she assured me that it was and began to steer me toward a

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COMMUNICATION WITHOUT BOUNDARIES

press conference that was under way.

This press management overkill begs the question: Do honest, above-board companies with good products and services and nothing untoward to hide need a press relations department? Unfortunately, I think they do. I was the CIO at PepsiCo during the "syringe in the Pepsi can" scare of the early '90s. If you don't remember the details, a couple claimed to have found a syringe in a can of Pepsi. Their lawyer

certainly that there was nothing to find.

Before long, most of the would-be victims and compensation seekers confessed to the hoax. It took years to regain our market position, but things could have been far worse had we failed to manage our public persona.

Managing perceptions and maintaining trust cuts both ways. Writers, myself included, need to be scrupulous about what we're willing to accept from individ-

This press management overkill begs the question: Do honest, above-board companies with good products and services and nothing untoward to hide need a press relations department?

wrote to the county health department, faxed the bottler and distributor, and called the news on their behalf. Within days, dozens of copycat victims and the press breathlessly piled on, and the national chains began pulling Pepsi and our other products out of their stores, giving precious shelf space away to our competitors.

Those of us who were familiar with the bottling process, the lightning speed of the production line and the particulars of how the cans are handled during filling and capping knew these claims were a pack of lies. (One woman was caught on a store security camera opening a can, slipping a syringe into it and walking it over to show the cashier.)

Had it not been for the good counsel of the PR department, we might have all run to the nearest television camera to say just that. Given the press feeding frenzy that was under way, that would have been a huge mistake. Instead, we publicly expressed our honest concern, recalled our product and aggressively inspected our bottling plants, despite our

uals and organizations whose product offerings rely on a few well-placed reviews. The sight of a couple hundred reporters descending on a lunch buffet as the steam tables are brought out can be a little unsettling. The readers of *CIO* and publications like it are a savvy bunch. They will lose respect for, and interest in, people, institutions and disciplines that appear incapable of making straightforward, unbiased, comparative judgments.

Readers, for their part, need to understand and consider the underlying dynamics of managed access, ad revenue generation and the weird dance that goes on between reporter and subject.

So, lesson learned, I guess. Only a couple million more to go. **CIO**

Have you had a close encounter with a public relations professional or member of the press? Tell Jerry about it at jgregoire@cio.com. Editor at Large Jerry Gregoire is a former CIO of Dell Computer and Pepsi Cola.



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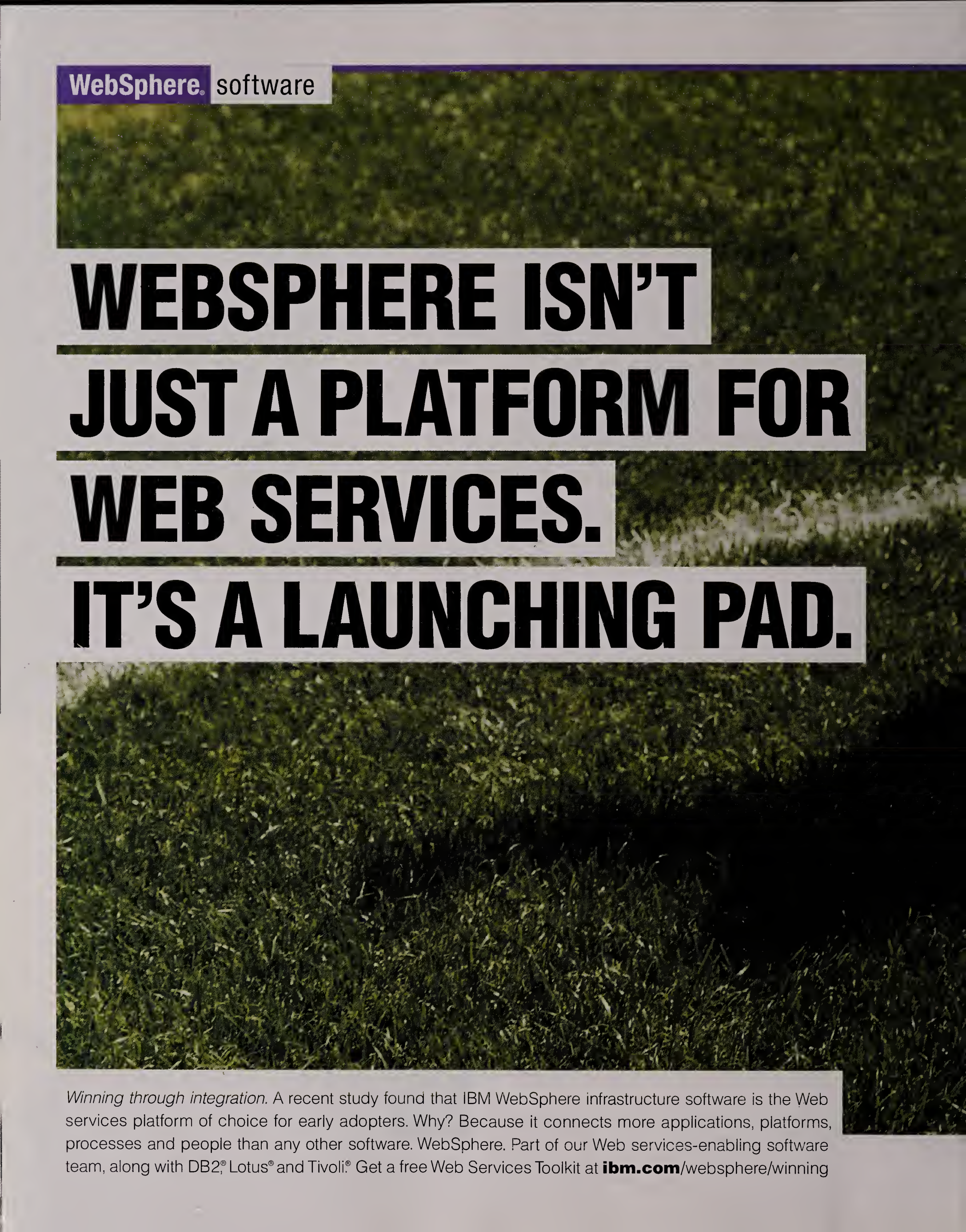
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TAKE the PLEDGE

THE CIO'S CODE OF ETHICAL DATA MANAGEMENT

Data has no ethics.

Data doesn't care how it's used.

But the use and misuse of data has become the critical issue for today's information-intensive enterprise. Who owns the data? Who is responsible for its management? Who is the guarantor of its integrity? CIOs, the guardians of business data, need a code to guide them. **BY SCOTT BERINATO**

All it took was one e-mail from an irate customer for Saab Cars USA CIO Jerry Rode to realize he had a developing public relations fiasco on his hands.

In 1999, Norcross, Ga.-based Saab hired four Internet marketing companies to send customers information about Saab's new models. And although the auto company had specified that the program be opt-in (meaning it would e-mail only the people who had agreed to receive such mail), one of the marketing companies apparently had a different definition of opt-in. And that meant one ticked-off customer, with more potentially on the way.

Rode fired the errant marketing company and immediately developed a formal policy surrounding the use of customer data. "The customer doesn't see ad agencies and contracted marketing firms. They see Saab USA spamming them," he says. "Finger-pointing after the fact won't make your customers feel better."

As Rode learned to his chagrin, data itself doesn't care how it's used. It will not stop itself from spamming customers or sharing personal, identifying details with third parties. It cannot decide to delete or preserve itself. Therefore, it falls on the shoulders of those who lord over ever larger terabytes of data—the CIOs—to develop ethical guidelines on how to manage it.

But most CIOs have not picked up the gauntlet. There are any number of reasons why. For one, the stuff is hard. The issue traps CIOs between two rather loathsome roles in the company—the bad guy or the fall guy. Either the CIO stops marketers from using data for purposes some customers are not comfortable with, thereby damming potential revenue streams. Or the CIO imparts no ethical code and is left to explain why the company has allowed a customer's data to be exploited. Similarly, the CIO can tell the CEO what he can and cannot do with the company's data, thereby putting his own job in jeopardy. Or he can go along and run the risk of finding himself culpable for some misuse of data.

Reader ROI

- ▶ Understand why it's crucial for CIOs to address data ethics
- ▶ Learn how some CIOs are managing their data with ethics in mind
- ▶ See how a doctrine on data ethics would elevate the CIO profession

No matter what the situation, ad hoc decision making on data ethics isn't viable any more. CIOs must start a meaningful conversation about ethics at their company. Hard money is at stake here. Companies such as DoubleClick and Qwest Communications, which were both forced to pull back from controversial plans to share customer data with other companies, have seen their stock prices plummet. Soft money is at stake too. Brands such as Saab Cars USA stand to suffer uncalculable losses when customers feel violated. Data ethics is not just a moral issue; it's the intersection of business and morality. And if the CIO doesn't take the lead, then someone else—like the customer or the government—will.

The goal here is to explain why CIOs need a code of ethics when it comes to data management, and then to propose such a code. (See "The Six Commandments of Ethical Data Management," this page.)

Rode, for one, is all for it. "I don't see ducking the problem and blaming it on marketing or saying something slipped by as the answer," he says. "I see this as the CIO's responsibility. We need to take ownership of the problem and develop some rules."

Function Creep

Everyone wants Scott Thompson's data. Thompson is executive vice president of Foster City, Calif.-based Inovant, the company Visa set up to handle its technology. Thompson's job includes the responsibilities of Visa CIO, the job from which he was promoted last year. At Inovant, he stands atop 35 billion credit and debit card transactions per year.

Sales and marketing would love to drill into Thompson's databases. They'd love to refine the data into loyalty programs, target marketing or partnerships between Visa and retailers. "There are lots of creative people coming up with these ideas," Thompson says. "This whole area of data sharing is enormous and growing. For the marketers, the sky's the limit."

But Thompson isn't playing ball. He is determined to prevent an environmental disaster: the pollution of the Visa brand through the violation of its customers' privacy. To share the data on what people spend their money on, in what stores, at what time of day—all of which and more resides in Visa's databases—would violate Visa's own rules for acceptable use of customer data.

Visa, Thompson says, errs on the side of caution with its credit card data policy, devised by Thompson along with staffers who specialize in privacy. He bars any use of it outside of its intended purpose, which is mainly billing. Keeping the data off-limits, he figures, keeps customers from choosing MasterCard instead.

This is not to say Thompson's not tempted to share the data. He is, every day. "Every single day of the week, someone outside our organization comes to us and says, 'If only we could use your data to

THE

The Six Commandments of Ethical Data Management

Electronic data about customers, partners and employees has become corporate America's most valuable asset. But the line between the proper and improper use of this asset is at best blurry. Should an employer be able to search employee files without employee consent? Should a company be able to sell customer data without informing the customer of its intent? What is a responsible approach to document deletion?

The law provides guidelines in many of those areas, but how a company chooses to act within the confines of the law is up to its officers. Since CIOs are responsible for the technology that collects, maintains and destroys corporate data, they sit smack in the middle of this ethical quagmire. Or they ought to. In an effort to provide guidelines for CIOs thinking hard about ethical data management (and to nudge those who aren't), we have developed—with the help of more than 100 CIOs—principles for ethical data management.

Here's how we did it: We asked members of the CIO Best Practice Exchange, our members-only online IT executive forum, to generate and then debate a set of principles for the ethical management of data. From this online discussion and follow-up telephone interviews, we drew up a set of seven principles to guide CIOs through the murky territory of data collection, manipulation and destruction.

Next, we put those seven principles back into the Exchange for a vote. The six survivors (those principles that received more than 50 percent of member votes) are listed right.

—Martha Heller

do this or profile that, it would be a license to print a zillion dollars for Visa," he says. "I've heard a half-dozen ideas for uses of this data where I thought, That's pretty clever, I know that would work. But as I've said, we made this decision. We're not going to do it."

However, a larger question remains: Can Thompson guarantee—as he did at one point during an interview—that some unethical use of data won't crop up at Inovant or Visa? Many experts, and lawyers, think he cannot. After all, in a large majority of cases, the unethical use of data happens not through the malicious scheming of

"I don't see ducking the problem and blaming it on marketing or saying something slipped by. I see this as the CIO's responsibility."

—JERRY RODE, CIO OF SAAB CARS USA

COMMANDMENTS

It has been proposed, and accepted, that...

1 Data is a valuable corporate asset and should be managed as such, like cash, facilities or any other corporate asset.

Members gave unanimous support to this principle. The philosophy here is simple: The better you manage your corporate data, the more valuable your corporate asset. Poor management of that data is like throwing away money.

2 The CIO is steward of corporate data and is responsible for managing it over its life cycle—from its generation to its appropriate destruction.

While all voting members agree that data is an asset, only 72 percent want to be responsible for the health of that asset. This then raises the question: If not the CIO, then who?

3 The CIO is responsible for controlling access to and use of data, as determined by governmental regulation and corporate policy.

According to 73 percent of our voters, marketing, HR or anyone else who wants a piece of the corporate jewels must go through their gatekeeper, the CIO.

4 The CIO is responsible for preventing the inappropriate destruction of data.

Where were the CIOs of Enron and Arthur Andersen during their massive data destruction campaigns?

Most companies, on the advice of corporate counsel, destroy data on a regular basis. But when the goal is to circumvent those policies and eliminate incriminating evidence, it falls on the CIO's shoulders, according to 69 percent of voters, to keep that data safe.

5 The CIO is responsible for bringing technological knowledge to the development of data management practices and policies.

Top executives cannot develop an effective data management policy without knowing the full range of technical possibilities for slicing, dicing, collecting and trashing it. And it is the CIO who owns that knowledge and must share with other members of the executive committee, according to all but one of the voters.

6 The CIO should partner with executive peers to develop and execute the organization's data management policies.

This statement received 100 percent voter support. It goes both ways: A company that creates data management policies without the input of its steward will wind up with a toothless policy, as will the CIO who rules over data with an iron fist.

It has been proposed and rejected that...

The CIO is responsible for maintaining the accuracy and integrity of data.

Fifty-two percent of our members voted this statement off the island. Why? Garbage in, garbage out, members told us. CIOs can build systems that force users to conform to format, but they can't do much about users who enter inaccurate information.

Do you accept THE CIO'S SIX COMMANDMENTS? Post your vote and comments at www.cio.com/readerpoll. What guidelines for ethical data management have we missed? E-mail Best Practice Exchange Director Martha Heller at mheller@cio.com.

a rogue marketer but rather by inattention.

Here's how: Customer data is collected and stored for some purpose, such as record keeping or billing. A sales or marketing professional figures out another way to use it. Or a partner company may ask to share it. Or another company could be willing to pay for it—pure profit that would be tempting for any company.

This is known as function creep, and it's a serious concern for ethicists. The classic example of function creep is the Social Security number, which started simply as a way to identify government retirement benefits and is now used as a sort of universal personal ID, found on everything from driver's licenses to savings accounts. But the problem is exacerbated by technology that makes it incredibly easy to repurpose data.

N2H2, a company that makes Web-filtering software, fell victim to function creep. N2H2 software is popular in secondary schools for filtering inappropriate content. To do this, the software collects information about every website a student visits.

With all that data, a marketer could learn much about the students' surfing habits, and in 2000 N2H2 offered to sell its data (in the aggregate) for \$10,000 a month, under the brand Class Clicks, through marketing company Roper Starch. N2H2 had two customers—a Web portal that focused on education and the Department of Defense, which wanted to use the data for recruiting programs. The plan was exposed to the public after only a month, in part by the DoD, which got cold feet about the program and notified privacy advocates. After an ensuing wildfire of publicity, N2H2 decided

to stop offering the Class Clicks service.

It sounds almost quaint to say that data should be used only for the purpose for which it was collected, and nothing else, but that is conventional ethical wisdom, according to Chris Hoofnagle, legislative counsel at the Electronic Privacy Information Center based in Washington, D.C. "Somehow, technology has led to this rogue theory that acquiring data about people gives you the right to own that data, that mere collection translates to ownership," Hoofnagle says. "But there's no theory of property that says that's OK." Hoofnagle blames the new mind-set on the ease with which data is now collected and stored, via database queries and massive CRM data warehousing systems.

The only current limits to function creep seem to be the limits of marketing and sales' collective imagination. "Marketing organizations can rationalize their way to the greater good to a point where it could blind anyone, especially a CIO sitting on the fence on ethics," says Jack Cranmer, CIO of Arizona-based Mayo Clinic Scottsdale, one of three group practices that make up the Mayo Foundation. In Cranmer's case, he's handling sensitive patient information that researchers want to use for medical studies. "But if you're targeting customers based on data you've collected for some other use, there's where you should start thinking about ethics," he says.

Often, by the time the CIO finds out about the function creep, or by the time it gets to corporate counsel, the marketing group is disseminating the data already, says Rich Honen, an attorney at Albany, N.Y.-based Honen and Wood, which advises corporate clients on data ethics. But Honen maintains that it's the CIO's responsibility to understand and track the flow of information and maintain an ongoing discussion with marketing and legal executives about the ethical use of the data.

Joel Reidenberg, professor of law at Fordham University in New York City and expert on data privacy, adds, "Look, there isn't a single company today that doesn't know where its money is. Why aren't companies paying attention to the flow of information the way they do money?"

CIO.com

Is it up to the CIO to start the conversation about the ethical uses of data? **WEIGH IN** with your opinion. To find the comment page, go to the Web Connections box at www.cio.com.



As executive vice president of Inovant, the company Visa set up to handle its technology, **Scott Thompson** errs on the side of caution: He bans the use of Visa's customer data for anything outside of its intended purpose, which is billing.

Whose Data Is It Anyway?

Last year, Reidenberg received an offer for cell phone service from AT&T Wireless. The offer revealed that AT&T Wireless had used Equifax, a credit reporting agency, to identify him as a likely customer. "We used information we obtained from a consumer reporting agency," the disclaimer read in part. This disclosure is required by the Fair Credit Reporting Act (FCRA). The FCRA also requires Equifax to disclose that it has sold a credit report and to whom, if a consumer asks. Reidenberg asked. Equifax told him it had sold his credit report to AT&T Wireless.

It was good business. Equifax made money selling data it already owned; AT&T Wireless could hone its target market to get a better response to its marketing campaign.

The bad part was that, by law, credit information can't be used to sell anything. Reidenberg cites the FCRA, which forbids such repurposing in every case except when the data is used for "a firm offer of credit or insurance." In other words, the only product you can sell based on credit data is credit.

A spokesman for Equifax says that as long as AT&T Wireless (or any company for that matter) is offering the cell phone service on a credit basis, such as allowing the use of the service before the consumer

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has to pay, it is in compliance with the FCRA. Since cases around unfair marketing based on credit data often languish in court, many companies may take a calculated risk that they won't run into too much legal trouble for using credit data in their targeted offers.

Reidenberg makes a distinction between what is legal and what is ethical. "The average consumer would have no idea AT&T Wireless was violating the law," he says. "But even if—and this is highly unlikely—even if the courts decided after five years that this was a legitimate use of customer data, the customers will be outraged."

Wisconsin and that you called them on Sundays, they could tailor a long-distance service expressly for you. If they sold the data to a travel agency, you'd receive solicitations for flights to Milwaukee.

Unlike the AT&T Wireless case, using this data seems to be legal. But customers didn't care about that. When they discovered Qwest's plan embedded in fine print in a Qwest brochure, they protested via the media, saying it was an unethical violation of their privacy. Qwest offered an opt-out service whereby consumers could call or go online and request that Qwest exclude their personal CPNI data.

"If you're targeting customers based on data you've collected for some other use, there's where you should start thinking about ethics."

—JACK CRANMER, CIO OF MAYO CLINIC SCOTTSDALE

In the end, customers decide whether a company has acted ethically, and very often a consumer's notion of the rules shares little in common with what's allowed under law.

Qwest Communications, a telecom company based in Denver, is learning this the hard way. Earlier this year, Qwest planned on sharing internal customer proprietary network information (CPNI) data about its 12 million customers with other companies. That means your phone bill. Whom you call. How long you talk. How much you pay. What services you select. How often you use directory assistance. Like Visa's credit card transaction data, CPNI data is a target marketer's dream. If marketers knew you had relatives in

This process proved so difficult that some privacy advocates accused Qwest of making it difficult on purpose, to keep the number of customers who opted out at a minimum.

Finally, under unyielding customer pressure, Qwest dropped the idea—for now. Pending the Federal Communications Commission's review of the rules around CPNI data later this year, Qwest has said it may yet use CPNI data as a marketing tool.

After several requests by CIO to speak to the CIO and chief privacy officer, a Qwest spokeswoman declined to comment, and questions sent via e-mail went unanswered.

Qwest could have avoided the flood of bad publicity by making

To Preserve or Not to Preserve. That Is the Question

Any CIO who does not have a corporatewide policy in place governing the retention and deletion of data is in big trouble

In general, the CIO's ethic is to preserve data at all cost. In the post-Enron era, that ethos is running smack into a more powerful corporate urge to get rid of any compromising data.

"I think, because of Enron, you'll see executives more focused on making sure there's nothing that will make us look bad," says Avram Kornberg, CTO of Oppenheimer Funds in New York City.

So what's a good CIO to do?

For starters, you should initiate the development of a clear-cut corporate policy that spells out when data should be preserved and when it is appropriate to delete it, if only to save storage space for

future data. And once that policy is in place, the CIO's responsibility is to raise objections if someone in your company asks you to delete data in a way that does not conform to company policy—or to legal policy.

"What happens is a CIO might get an order to delete something and he'll nod and say that's fine, thinking nothing of the request, but then the obscure machinery of fate exposes this and people think you've done something unethical," says Colin Potts, a privacy and technology expert who specializes in ethical issues as associate professor of computing at Georgia Tech. "It is not enough to have good intentions in IT,

to think as long as you're not stealing or lying you're ethical. You have to look at it like engineering; you have to think about the technical consequences of what you're doing."

This means CIOs should save data, not delete it, unless there's an extremely sound reason to delete it. Even then, don't assume that data's deleted in the true sense of the word. Technology forensics experts can recover quite a bit of deleted data.

"The CIO will always be somewhat on the line for this," argues Thomas Bodenberg, a senior research associate at The Conference Board in New York City. "He has the tools."

—S.B.



As CIO of Saab Cars USA, **Jerry Rode** realized he needed a formal data ethics policy after an online marketing company targeted Saab customers even though they had opted out of an e-mail solicitation.

the CPNI marketing program opt-in from the beginning. According to privacy advocates, opt-in is the appropriate way to handle customer data. Personal data is untouchable until you, the consumer, give us permission to use it after we, the company, tell you precisely what we want to use it for.

The problem is, marketers will do anything to avoid opt-in marketing. Statistics suggest that when personal data marketing becomes opt-in, more than nine out of 10 consumers will decline to join. If only 10 percent of the target market chooses to participate, the marketers are left with data that doesn't tell them very much.

The Next Branding Trend

When CIOs do take a lead on data ethics, the results are positive. Gene Elias, CIO of Quiksilver, a surfwear clothing company based in Huntington Beach, Calif., that targets 9- to 15-year-old children, has taken this thinking to the extreme. Elias has prohibited sales and marketing from using any of the customer data he possesses—which amounts to personal information collected when people join mailing lists or become members at the Quiksilver website. He says the company doesn't retain credit card numbers after transactions in Quiksilver stores, and all of his data ethics guidelines pass muster worldwide.

Clearly such limits set up an adversarial relationship between marketing, which stands to benefit greatly from collecting and repur-

posing data, and the CIO, who stands to lose his reputation over a privacy flap. "So far, knock on wood, marketing understands when I tell them there are pitfalls in doing certain things with data," says Saab's Rode. "But it's also helped to offer alternatives, instead of just being the 'no' man."

One alternative suggested by Rode that has paid back is an online service called Saab-i. Rode makes sure it's the ultimate opt-in—with absolutely no use of data without express consent of the consumers. In exchange for agreeing to be marketed to and have their data used in aggregate form, consumers obtain access to early notification of Saab promotions and can get their car questions answered. Rode says membership has doubled every year for three years.

Both Rode and Elias believe the next branding trend in the United States will be trust. Marketing opportunities lost will be made up through customer loyalty. Consumers will choose between vendors based on their policies around how ethically the company treats personal information, among other privacy litmus tests. And CIOs, they say, can play a crucial role in promoting this trend.

While Rode has developed formal rules on how to manage customer data, Elias admits that his are mostly informal. "If someone new came into marketing and I felt like they didn't understand how I guard this data, I might change my tune, make the rules a little more formal because the relationship is not there," he says.

A Hippocratic Oath

It might work informally at Quiksilver, but as Mayo Clinic's Cranmer notes, "not everyone has a strong sense of ethics." As a result, some CIOs say there needs to be a formal code of ethics or principles that lay out the CIO's moral obligations when it comes to data. Such a doctrine is meant to help CIOs in a way that the Hippocratic oath guides doctors. The six commandments we have suggested on Page 58 address not only the issue of customer data but data retention and deletion as well, and the role that the CIO should play in communicating to the rest of the organization why such guidelines are crucial.

"If we have guidelines, it will help the CIO know where the line is," says Cranmer. "It would also allow CIOs to hold up a document that says, 'This is what I ascribe to.'" **CIO**

Got any ethical conundrums you'd like to share? Let Senior Writer Scott Berinato know at sberinato@cio.com.

THE I.T. INSIDE THE WORLD'S BIGGEST COMPANY

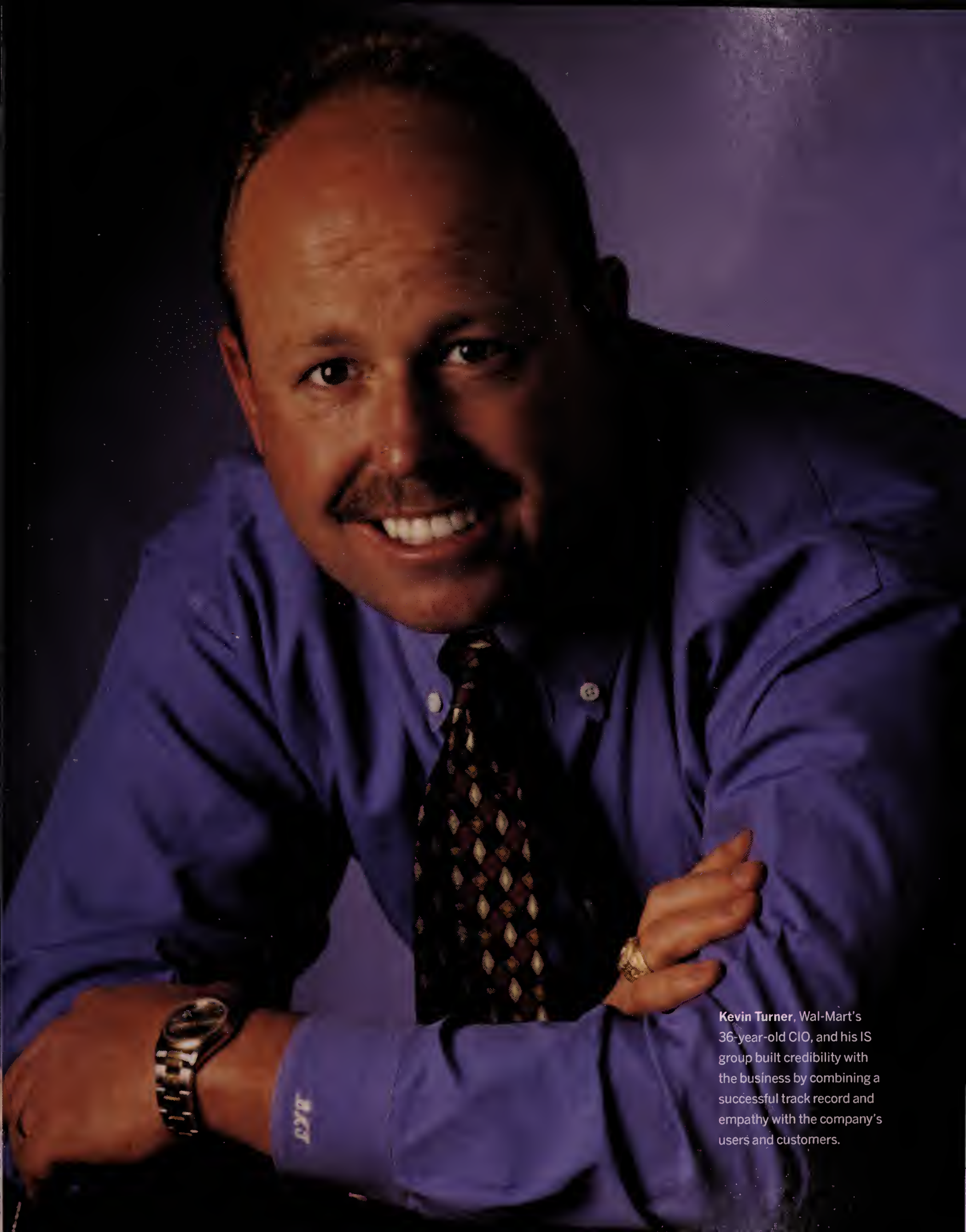
After several years out of the press spotlight, Wal-Mart reopens its doors for *CIO*'s exclusive interview with CIO Kevin Turner, who shares the secrets behind Wal-Mart's global growth, what's happened since Sept. 11 and which technologies the retailer is eyeing

BY ABBIE LUNDBERG

Wal-Mart is big. To understand just how big, consider that on Nov. 23, 2001, the 40-year-old retailer sold more than \$1.25 billion worth of goods in a single day. The company has 4,457 stores, 30,000 suppliers, annual sales of more than \$217 billion—and one information system. According to CIO Kevin Turner, running centralized IS with homegrown, common-source code gives Wal-Mart a competitive advantage and helps the company maintain one of the lowest expense structures in retail.

Turner stepped into the top CIO spot two and a half years ago at age 34, when former CIO Randy Mott departed for Dell. Turner had served as Mott's second in command, and prior to that he ran application development as Wal-Mart's youngest corporate officer

PHOTOGRAPHY BY DAN BRYANT



Kevin Turner, Wal-Mart's 36-year-old CIO, and his IS group built credibility with the business by combining a successful track record and empathy with the company's users and customers.

“In any development effort, our IS people are expected to get out and do the function before they do the system specification, design or change analysis.”

—KEVIN TURNER

(29 years old). In 1997, Turner became the first recipient of the Sam M. Walton Entrepreneur of the Year award, a very high honor at the company. But when asked about his accomplishments, this CIO talks primarily about the capabilities and accomplishments of the Wal-Mart IS team, the vision of its CEOs past and present, and how blessed (his word) he is to work with such a remarkable group of people and for a company like Wal-Mart.

CIO Editor in Chief Abbie Lundberg talked with Turner this spring about Wal-Mart's competitive position, IS strategy, development methodology and the importance of security for a just-in-time company in a post-9/11 world.

CIO: Wal-Mart's the largest company in the world now. Has that changed your priorities?

Kevin Turner: You know, we don't talk a lot at Wal-Mart about being the largest company in the world. [Founder] Sam Walton never had a goal of being the largest company in the world, nor did [previous CEO] David Glass or [current CEO] Lee Scott. What we do talk about is being the best company in the world. And having something called the divine discontent, which says that you'll never be satisfied with where you're at or where you're going, and that you can always improve. Striving for excellence is one of our three core beliefs. Sam died in 1992, and everything in the company in the last 10 years has changed except for three things: Have respect for the individual, practice excellent customer service and strive for excellence in all that we do. In that third core belief, which is very strategic for us, is that divine discontent.

You also have three basic philosophies behind your IS strategy. Tell us about that.

The first philosophy is to run a centralized information system for our operations all over the world, and we run that from Arkansas. The second is to have common systems and common platforms. The third is to be merchants first and technologists second.

Now, along the way, a lot of folks were not optimistic that we'd be able to grow as much as we have and still keep our IS centralized and running on common platforms. But that's been one of the things that's allowed us to drive our costs down and helps us be really efficient. Whether you run a store in Bentonville, Ark., or in Miami, Fla., or in Leeds, England, the processes and the systems are generally the same. We're able to transfer people from one store to the other, and they're able to pick up right where they left off. We don't have significant downtime or startup time in the transition.

How have you made that work, given your rate of global growth and your numerous acquisitions?

When we started down the path to become a global company, we were driving the systems that had worked in the United States out to the other countries. We made a lot of mistakes doing that, and there were times when we questioned whether we were going to be able to run the world centrally from an IS perspective. What we've come up with is a model of decentralized decisions but centralized systems and controls. We will have a common system and a common platform, but we have to allow a great deal of flexibility in our systems so that the people in those

local markets can do their job in the best, most effective way.

Say you've made an overseas acquisition, and there is a system there that may or may not be better than what you've got already. What are the steps you go through in evaluating that?

When we acquire a business, we start by defining success with the customer. What does success with the customer look like? We haven't always been good at determining that, but we've put a lot of emphasis on it in the last 18 to 24 months. This is critical so that everyone has the same definition of success.

The next step is to eliminate before we automate. Eliminate steps, processes, reports, keystrokes; eliminate any activity

Wal-Mart's Kevin Turner

Title: Executive vice president and CIO

IS staff: 1,998

Base: Bentonville, Ark.

Age: 36

Years at Wal-Mart: 17

First position at Wal-Mart: Cashier (while working his way through college)

Other positions: Customer service manager, store auditor, business analyst, strategy manager, VP of application development, assistant CIO

Education: B.S. in business management from East Central University in Ada, Okla.

Wal-Mart Stores Inc.

Headquarters: Bentonville, Ark.

Revenue: \$217.8 billion (2001)

Employees: 1.08 million associates in the United States; 303,000 internationally

that you possibly can for two reasons: One, you'll end up building a whole lot better system that's easier to support, and two, invariably you will have a better solution that's more [user] friendly.

Next is to do a business process overview, where we physically lay out what the system looks like from a business process standpoint. We validate that with the best business process experts in our company before we start the design. Once we get the system built, then we pilot it with our best and toughest customers, stores, distribution centers and clubs. If you

pick the lowest volume store or easiest customers to test with, you don't find all of the things that you need to find.

That approach can work only if your people truly understand the business. How do you make that happen?

In any development effort, our [IS] people are expected to get out and do the function before they do the system specification, design or change analysis. The key there is to *do* the function, not just observe it. So we actually insert them into the business roles. As a result, they come back with a lot more empathy and a whole lot better understanding and vision of where we need to go and how we need to proceed.

We've learned some hard lessons in our stores, clubs and distribution centers when we developed something and people didn't use it, and they chose to find other ways to get the job done. We are working hard to develop systems that are easy to use. That puts an awesome responsibility on that developer to get out and understand the

business. That's one of our key things: We're merchants first, technologists second.

ON EXECUTION

Getting beyond the up-front process, how do your people actually execute? Do you have principles of execution?

That's something we talk a lot about because, as a company, we're big on execution. You can't name a great team that wasn't good at discipline. Execution and discipline are not the enemies of enthusiasm. We have a very clear set of critical success factors that every associate in our division has to live by, and they are generally conditions of employment. Some of them are complicated and some of them are very simple: excellent customer service, testing and validation before you roll it out, balance and controls, payback and ROI. All new [IS] associates are indoctrinated into that set of disciplines, and all associates review it at least on an annual basis. The disciplines are the same for everybody regardless of what team you're on—infrastructure or development or help desk.

How do you recognize failure of execution?

Well, there are a lot of ways to recognize failure, such as if a project is missing end dates. We don't call them completion or target dates; we call them end dates because everybody should have the same definition of *end date*. We track projects against the end date and surface those things that are behind or in trouble. The second indicator comes from on-the-job reviewing and listening. I and others who are not on the project team go out where these new systems are deployed and talk to the people doing the work. We ask them how it's going, how things are working, what they'd like to see different. That's where you really surface feedback that can help project teams get even better.

Sometimes we have to make



These members of the IS senior leadership team have also worked at Wal-Mart as sales clerks, store managers and assistant store managers, internal auditors and merchandise buyers. Clockwise from top left, they are David Porter, Tony Puckett, Ken Gish, Carol Mosely, Dan Phillips and Linda Dillman.

“Technology at this point is simply a means to an end. What is really strategic is the use of the information and how we exploit and maximize it.” —KEVIN TURNER

management changes to bring a project across the finish line. It's hard because no one wants to give up on a person or a team that's struggling. But there are times when the right thing to do for everyone involved is to change the quarterback and put somebody else on the team.

ON COMING TECHNOLOGIES

What do you see coming in retail technology in the next five years?

I'm excited about the future. There will be some great opportunities in storage. We will have ubiquitous storage within the next three years that will help us truly drive anywhere-anytime-anything computing, which is very important for our business. I think that wireless will continue to be exploited, and at some point our customers will walk into one of our stores or a Sam's Club and use their own device on our network to accomplish whatever they want. We're in the process of building an infrastructure that will enable that.

Radio frequency identification is also exciting, and we're working with MIT on the development of “cheap chips.” I think that you will see cheap chips replace bar codes over time, and we'll be able to intelligently drive the supply chain through what's on the shelf and what's in the back without our associates having to verify it.

Voice over IP will certainly take off and will lower costs and help us all from an infrastructure standpoint. We all know what it's like today when an associate moves or transfers and you have to change the phones. They'll simply be able to take the phone with them, plug it back in, and everything will be working without any systemic changes.

I think voice recognition's time will come in the next three years. We have not

scratched the surface with this technology in retail and certainly not yet at Wal-Mart. We are using some voice recognition technology in our distribution centers, but I think you will continue to see more and more areas where it's exploited, and it will eliminate the need for some of the mobile computing we do in our stores, clubs and distribution centers today.

What about the future of your custom applications?

From a development standpoint, I think the biggest opportunity we have is leveraging information. In the future, we should actually be simulating our business with an inductive model versus a deductive model to determine our opportunities to maximize sales before the actual event occurs. An example would be, say, that we start running Easter [simulations] in December so that we can better prepare and know what the Easter business will look like. We're really excited about the potential for predictive information and simulation.

We've also got a strategic initiative going on with self-service. We are working to provide self-service technology for our associates, prospective associates, customers and members, and to eliminate paper and paper forms. Having an associate portal and devices on our sales floors will let customers and members get product information, and let us do computer-assisted selling.

What is your process for evaluating new technologies?

We leverage a lot of different fronts. We're plugged into the research and development labs of all of our key suppliers, whether it be Cisco, IBM, NCR, AT&T or HP. We spend a lot of time in Bell Labs, research

centers and other places helping influence where we might go in the future.

We also have a team of folks that helps us do proof of concept and pilot key technologies that could be coming in the future. We need to look at the technology in a pilot environment so we can really understand its ramifications or benefits.

And everybody is expected to be an expert in the industry or business that they're in, and we rely on them to make sure that we hear about all the ideas that come together, especially those that come from the people who actually do the work.

How do you do that? Say somebody in the IS group somewhere has an idea for something. How does it get to you?

Just walk up and tell me. It's a very open environment. As an example, we will have training sessions or grassroots sessions with key [internal] customers where we break down their area to see what we can do better and how we can do it. We're proactively looking for those things that can help us change our company. And when you get proactive, you can play offense as opposed to defense where you're reacting to a set of issues. Proactively driving a set of strategies or driving a set of new initiatives helps get those customers on your side. They believe that they are part of the process and that you are there to help.

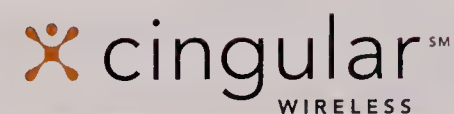
ON SECURITY AND DATA MANAGEMENT

Wal-Mart has built the company in large part on its efficient supply chain and inventory management. All of that is driven by, and dependent on, the flow of information. Because of the potential impact of an event like Sept. 11 on this flow, are you doing anything differently in business continuity planning or disaster recovery?



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What do you have to say?™

“Transformational ideas don’t find you; you need to go out and find them.” —KEVIN TURNER

Unfortunately, we are doing things differently as a result of Sept. 11, and I say unfortunately because we’re investing a lot of money, resources and time in security, privacy and similar activities. Things that were once objectives and goals are now a way of life. That’s really the transition that’s happened for us since 9/11. We’re going to be burdened with it for quite some time. I’d really like to see our technology vendors step up and help us with these vulnerabilities because the money that we’re pouring into security right now is being pulled away from development and strategic things that we could be investing in. A lot of the vulnerabilities that we deal with are preventable and could be avoided if the technology vendors would get proactive and do the due diligence to tighten up their products.

In security, companies typically spend maybe 20 percent on prevention and 80 percent on recovery or dealing with problems after the fact. Have you shifted the amount you spend into prevention?

I’d say we’re spending 80 percent on prevention right now. Necessity is the mother of invention, and we’ve invested a lot of knowledge and capital in intrusion detection and playing as much offense as we can to make sure that we’re protecting our company. Personally, every day I spend time on security.

With the Enron and Wall Street scandals, we’ve seen how important it is to know how the data that’s driving the company is being handled, managed and monitored. How do you treat this responsibility?

My job as the chief information officer for

Wal-Mart is to bring visibility to all of our information, to eliminate the blind spots, to not wait to be asked to develop controls and balances but to be the champion for the information. In the last 10 years, the driver of change has transitioned from technology to information. Technology at this point is simply a means to an end. What is really strategic is the use of the information and how we exploit and maximize it. We’re in a business that competes at the speed of information, and my job is to ensure we present it in such a way that we use it to drive execution and improvements in our business.

ON THE CHANGING CIO ROLE

You see the CIO as champion of information now. In what ways has the role of the CIO shifted?

I think the role is changing quite significantly. Someone once said if we do everything perfectly in our profession, we would still get a B- grade. You can do one of two things with that. You can let it eat you up, and deem yourself unappreciated, or you can decide to better that and become a strategic element in your company. This idea of being more transformational is about making sure you identify those things that are truly transformational and put your effort and resources behind them. That’s the shift happening with CIOs, and my role is to be more strategic, more plugged in to the big ideas that can change our company. And by the way, those ideas don’t find you; you need to go out and find them. That’s something Lee Scott has really

pushed home to me—that I’ve got to be more proactive in seeking out those transformational ideas so that we can widen our gap over our competition.

You’re fortunate to have a CEO who is pushing that transformation agenda from the top. What about CIOs who can’t get transformation on the agenda?

The key is credibility. Our formula for credibility is track record plus empathy equals credibility. That begins and ends with learning and understanding the business you’re in, where it’s going and how it’s going to get there. And then you bring forth those things in IT that can change the world.

Of course, the infrastructure today has to work like a light switch. People really don’t want to know how it works, they just want to know that it works every time, and that it’s fast, reliable and scaleable. This is required in order to establish the credibility that is key to getting the opportunity to change your company.

For the CIO’s responsibilities going forward, what percent is technology versus business strategy?

Ideally support and infrastructure are zero to 1 percent, but that’s not the case. There are times when that’s a lot of what we’re doing. Obviously strategy and business learning have to dominate over half of your time. The other half should be dominated by the people that make us successful. One of the things that I’ve learned at Wal-Mart is it’s not the people that I work for that determine whether I am successful or not, it is largely the people that I get to work with. It’s really important that you involve them, that you help them, that you give them the time to get out and learn the business and hold them accountable for that. Typically they’ll exceed your expectations every time. **CIO**

What do you think of Wal-Mart’s IT strategy? Tell Editor in Chief Abbie Lundberg at lundberg@cio.com.

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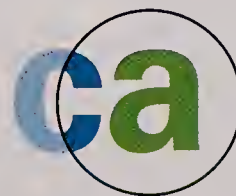
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Like everyone else in the airline industry, JetBlue Airways saw business drop in the aftermath of September 11—the day the startup was scheduled to unveil its initial public offering. But unlike most others, JetBlue rebounded by year's end and continued to climb.

The low-cost carrier's income statement flew against travel industry trends. JetBlue posted a profit of \$38.5 million on \$320.4 million in revenue in 2001, a year in which the U.S. airline industry lost \$7.7 billion. In the first quarter of 2002, the company registered a \$13 million profit on \$133.4 million in

jetBlue

SKIES AHEAD

The founders of JetBlue Airways use IT as the backbone of their “high-tech, high-touch” startup. Can you say, “last-mover advantage”?

BY STEPHANIE OVERBY

revenue when major airlines lost another \$2.4 billion. JetBlue kept on hiring employees, continued to buy jets and upped its IT investments.

And seven months after the scrapped IPO announcement, JetBlue went public on April 12, 2002, posting 67 percent gains in the first day of trading—the best performing stock debut on Wall Street in more than a year.

So how has this startup airline managed to take off when some of the industry's biggest names have struggled to stay aloft? What makes JetBlue grow in a field where more than 100 new ventures have failed since deregulation in 1978? And how can it manage its future in an industry characterized by low profit margins and high fixed costs, in which a minor revenue shortfall can have a disproportionately major effect on finance (the four-day shutdown after 9/11 providing the most extreme example)?

Call it starting with a fresh canvas. Call it last-mover advantage. And call IT central to the plot.

JetBlue, started four years ago by a duo of airline industry veterans who amassed \$160 million in capital, began with a simple

Reader ROI

- See how IT drives a startup company in a mature industry
- Explore what you can do with a clean IT slate



JetBlue Airways President Dave Barger (right) says he and CIO Jeff Cohen have an ongoing brainstorming session about IT projects that will improve existing business processes.

Startup Strategies

plan to offer high-end customer service at low-end prices (averaging \$99 each way). So while passenger-facing elements emphasize service and comfort—JetBlue boasted a new fleet of Airbus A320 planes with all-leather upholstery and seat-back TVs when it first flew in 2000—executives have invested heavily in automation, from ticket sales that stress direct-sale Web purchases to electronic tagging on bags.

“They’ve redefined what is expected of a startup airline,” says Stuart Klaskin, a Coral Gables, Fla.-based aviation consultant. “They said, Let’s completely wipe the slate clean. And from a technology standpoint and a customer service standpoint, they have done things that most other people in the airline industry have only thought about.”

So far, that combination of being a late arriver and early adopter is serving JetBlue well. The airline operates at 70 percent of the cost of the biggest carriers, while flying significantly fuller planes. It remains a nonunion shop. JetBlue also sees half of its customers return to fly again; and 20 percent of passengers make up 50 percent of the airline’s revenue. And there’s that matter of profits.

A Blue-Sky Idea

David Neeleman, CEO of JetBlue, would have started this new venture earlier if he could have. He’d done it before.

In 1984, Neeleman cofounded Morris Air, a Salt Lake City-based airline that became the first to offer ticketless travel, a program developed in-house. In 1993, Morris Air was snapped up for \$130 million by low-cost leader Southwest Airlines, which picked up the e-ticket tack and brought Neeleman on board as an executive planning committee member. But he lasted just six months, frustrated, he says, by the lack of automation there. “When I got to Southwest, you couldn’t even make a reservation on the phone. You were instructed to go to the airport to buy your ticket,” Neeleman says. “And they were still using the old mainframe system they had inherited from Braniff.” When he left the

JetBlue’s Top 10

The IT investments that the airline bet on

MICROSOFT EXCHANGE 2000

Implemented: Feb. 2000

Cost: \$300,000

Description: E-mail server

Benefit: No specific cost savings cited; part of standardization on Microsoft products

Benefit: Electronic record-keeping cuts costs and improves efficiency

JETBLUE.COM WEBSITE

Implemented: Jan. 2000

Cost: \$450,000 plus internal development costs

Description: Public website

Benefit: Online sales expected to top \$400 million in 2002

DASH GROUP MAINTENANCE SYSTEM

Implemented: Oct. 1999

Cost: \$120,000

Description: Software to log all airplane parts and their time cycles

Benefit: Electronic system for tracking parts; trims manual tracking costs

OPEN SKIES RESERVATION SYSTEM

Implemented: Jan. 2000

Cost: Approximately \$100,000/month

Description: Airline reservation and accounting system

Benefit: Important for customer service and sales tracking

BEST SOFTWARE HR/PAYROLL SOFTWARE

Implemented: Nov. 1999

Cost: \$150,000

Description: Enterprise human resources software

Benefit: Consolidates several JetBlue pay schedules into one system

PAPERLESS COCKPIT

Implemented: Jan. 2000

Cost: \$100,000 (internal development)

Description: Pilot laptops

Benefit: Keeps pilot manuals updated (FAA regulated) while saving hundreds of thousands on printing costs

BORNEMANN ASSOCIATES FLIGHT PLANNING SYSTEM

Implemented: Dec. 1999

Cost: \$120,000/year

Description: Software that handles all flight planning for JetBlue

Benefit: Drives down costs; makes operations more efficient

INTRANET

Implemented: Oct. 2000

Cost: \$200,000 (internal development)

Description: Intranet

Benefit: Connects 2,100 employees

AVIATION TRAINING MANAGEMENT SYSTEM

Implemented: Dec. 1999

Cost: \$90,000 plus \$45,000 for customization

Description: Database tracks employee training records

MICROSOFT SHAREPOINT PORTAL

Implemented: Nov. 2000

Cost: Acquired via Microsoft development partners program and \$250,000 in enhancements

Description: Portal for flight manual updates; supports paperless cockpit

Benefit: Allows electronic changes to flight manuals every few days

Dallas-based airline, then-CEO Herb Kelleher asked him to sign a five-year non-compete agreement.

While at Morris Air, Neeleman had worked with college student David Evans to develop a unified accounting and reservations system. When he left Southwest, he and Evans decided to create a company to sell the system to small and midsize airlines.

Unlike most other reservation systems, it integrated electronic ticketing, Internet booking and revenue management tools, and generated timely operational and financial reports. The company, Open Skies, provided systems for the likes of WestJet and former British Airways’ low-fare subsidiary Go Fly. All the while, Neeleman was developing his next blue-sky idea for a new low-

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Startup Strategies

cost, low-price air carrier. "We tested a lot of technologies during that time," Neeleman says. "Open Skies became a great test laboratory for JetBlue."

When his noncompete pact with Southwest expired in 1998, Neeleman sold Open Skies to Hewlett-Packard for an undisclosed amount and began working on the launch of his new company. He raised capital from five previous investors in Morris Air and landed investor George Soros to boot. Neeleman decided to base the new airline in New York City—John F. Kennedy International Airport, to be exact—which hadn't seen a low-cost carrier

since People Express hit the skids in 1986.

Neeleman then hired Dave Barger, who led a turnaround at Continental Airlines, as president and COO, and began to build what he saw as a "high-tech, high-touch" airline: all new airplanes of a single body type (more costly to purchase but easier to maintain), paperless business processes (whether it's at headquarter offices in Kew Gardens, N.Y., or in the pilot's cockpit) to save both time and money, and enthusiastic employees to deliver good service. "What they set out to do was take the 21st century electronic business model and apply it to aviation," explains John Kasarda, an airline industry expert at the University of North Carolina's Kenan-Flagler Business School. "They took what was cutting edge in terms of digital business and translated it to aviation. It was surprising somebody hadn't done it sooner."

Neeleman and Barger made a series of decisions to simplify the business and take advantage of their IT bent.

■ They developed plans for point-to-point service in high-volume corridors (New York to South Florida, Seattle and L.A.-Long Beach, for example), thus avoiding the costs and business process complications associated with the hub-and-spoke system that major airlines use to reach all markets. "We didn't want to be all things to all people. We wanted to go where we could make money," Neeleman says. So no flights to Chicago yet.

■ They avoid travel agents (average cost: \$14 per ticket). So they set up reservations agents in Utah, where work-at-home operators use voice over IP (VoIP) lines (average cost: \$4.50 per ticket). There's also a big Internet reservations push on JetBlue.com (50 cents per ticket). And, of course, all ticketless travel.

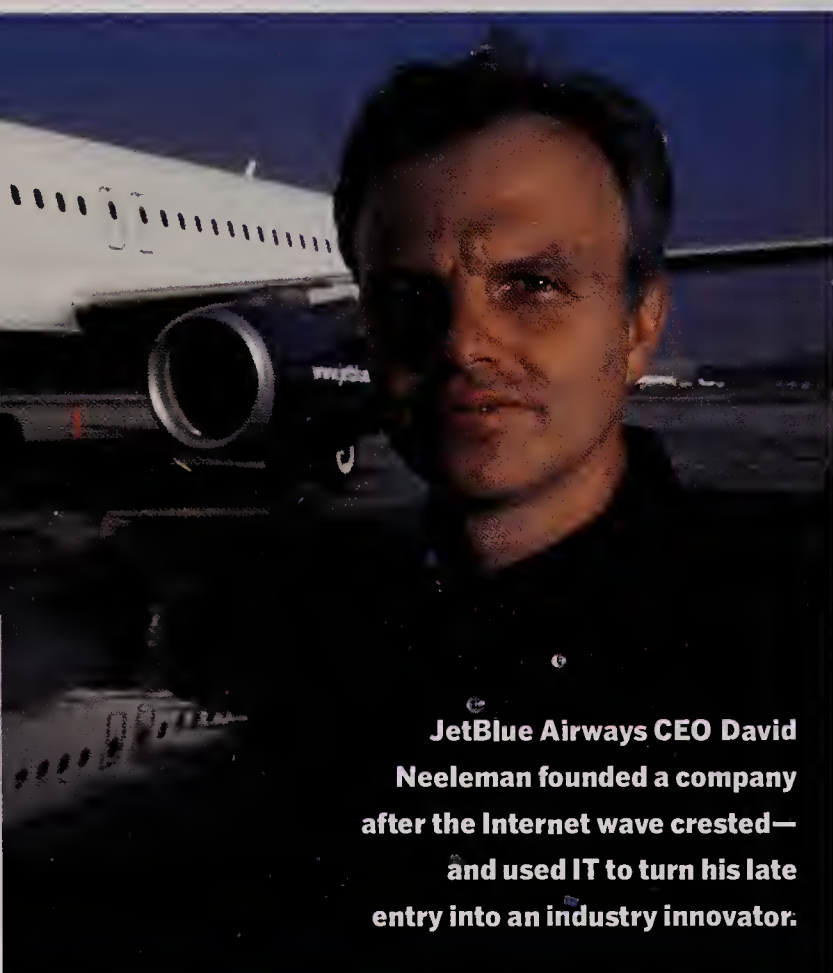
■ They created the industry's first paperless cockpit, equipping pilots and first officers with laptops to access electronic flight manuals and make pre-flight load and balance calculations.

"If we didn't have this, it would delay us 15 or 20 minutes, at least," says Kevin Carney, a JetBlue first officer typing away on his HP laptop before a recent Friday afternoon flight to Fort Lauderdale, Fla. "I used to work at US Airways, and they didn't have anything like this. None of the airlines do."

Overall, the plan was to create a cost structure that could support low fares without doing it on the backs of labor or sacrificing service. "You can be efficient and effective and deliver a great experience at the same time," says Neeleman. The trickiest thing during the incubation period, he says, was thinking up the name—JetBlue—which in the end Neeleman thought just sounded cool. And don't forget about finding the right person to help him and Barger computerize every aspect of the airline, which was scheduled to launch in February 2000.

A New CIO's Clean Slate

Jeff Cohen joined JetBlue as a consultant on Jan. 3, 2000, just a month before the airline was scheduled to take its inaugural flight. Hired to help with the FAA certification of JetBlue as an airline, Cohen also helped to stabilize the network to get it ready for the big Internet reservations push. After three months, Neeleman and Barger asked Cohen to sign on full-time as the company's first CIO. "It was, 'Enter, stage



JetBlue Airways CEO David Neeleman founded a company after the Internet wave crested—and used IT to turn his late entry into an industry innovator.

JetBlue vs. Airline Industry 2001

	JETBLUE	AVERAGE
Cost per available seat mile	6.98 cents	10.14 cents
Operating margin in 2001	8.4 percent	(-8.7 percent)
Load factor	78 percent	71.3 percent
On-time record	84.5 percent	77.4 percent
Mishandled bags	2.01 per 1,000 passengers	4.55 per 1,000 passengers
Customer complaints	1.06 per 100,000 boardings	2.11 per 100,000 boardings

Sources: Air Transport Association, U.S. Department of Transportation, JetBlue Airways, *The New York Times*

left...like, now," jokes Barger.

Beyond the cockpit and network projects, Cohen had no legacy systems, an open budget and one mandate from Neeleman: Automate everything. "From the beginning, I've basically had to wake up every day and figure out how we stay a low-cost airline, without bringing in huge ideas that will cost a huge amount of money and aren't aligned with our business model," says Cohen.

To that end, Cohen has removed the acronym ROI—so important to him as a consultant—from his vocabulary. Instead, the acronym you will hear—and hear a lot—is cost per available seat mile (CASM). It's the industry measurement of the costs incurred by an airline per mile that could be flown. Instead of ROI with new IT projects, says Barger, Cohen's direct boss, "we ask, Does it drive efficiency?"

That means Cohen and his staff of 36, a quarter of them developers, test out lots of ideas and support a lot of skunk works projects. Initiatives get the go-ahead based on whether the technology application would help JetBlue maintain its cost structure and how it affects the company's CASM.

Currently, JetBlue has a CASM of under 7 cents per seat mile, about 25 percent less than the average of major carriers. When it comes to creating and keeping that low cost structure, "IT is definitely the enabler," says Barger. Keeping CASM low was the impetus for Neeleman to charge Cohen to set up and maintain VoIP lines for 600 at-home JetBlue reservation agents, creating the industry's only virtual call center. It's why the cost-saving paperless cockpit got the green light before the CIO came aboard.

Keeping CASM low was the reason Cohen chose to standardize on Microsoft products (the decision helps to limit his staff's size—and the number of technologies they support). He also avoids outsourcing and consultant agreements (except when purchasing a product from a vendor), preferring to do most development in-house. So, you have JetBlue hiring outside help from (the familiar) Open Skies as its reservation and revenue accounting system vendor. And yet

The JetBlue Experience

A passenger's-eye view of the airline's IT-driven strategy

TO BUY A TICKET, you call JetBlue's toll-free reservations number, where you're connected to a reservations agent working from home on a voice over IP line, or you can log on to JetBlue's website—both money savers for the air carrier.

When you check in at John F. Kennedy International Airport's Terminal 6, a voice emanating from a large, flat-panel LCD tells you window 17 is open. You check in and hand over your bags in about 45 seconds, noting that the man behind the counter is not furiously typing for five minutes just to find you an aisle seat over the wing.

After being screened at security, you find another large computer screen at the center of the round terminal, where a Windows-based program tracks all of this airline's flights and weather conditions on a map in real-time. Onboard the new Airbus A320, you note the pilot in his "paperless cockpit" typing away on a laptop to adjust the flight plan for current weather conditions. A small TV screen also resides in the cockpit; it's connected to hidden cameras so that pilots can keep an eye on activity in the cabin for security purposes.

You settle into your leather seat. A voice comes over the PA system. "Hi, my name is David Neeleman. I'm the CEO," says the tall, gray-haired man at the front of the cabin, who makes this trek once a week. "We fly 10 flights a day to Fort Lauderdale, and we hope if you like your flight today you'll tell your friends."

Three hours later, you land at Fort Lauderdale-Hollywood International Airport and find your suitcase waiting for you at baggage claim—instead of the other way around—thanks to an electronic bag-tagging system. **-S.O.**

the company's own developers built a program called Blue Performance, to track operational data (updated flight by flight), and created an intranet to share the information with JetBlue's 2,800 crew members.

"Having that kind of real-time information at your fingers is really more critical than anything," explains Neeleman. "Other, older airlines spend billions and billions of dollars and use staffs of hundreds to try to pull this stuff, and we have it baked into the system."

That focus on low costs and efficiency also drove the in-house development of JEMS (JetBlue event management system) to track all safety-related incidents in the company and the decision to use BlackBerry wireless devices to report and respond to irregular operations—anything from weather delays to a passenger injured by his own briefcase when he opened the overhead bin. And that's why routine tasks, like getting expense approvals or processing payroll, are done digitally.

But in a culture so geared up for gadgets, it's also Cohen's responsibility to draw the line between cutting-edge, cool stuff and technology that actually helps pilot JetBlue's financial performance. For example, Cohen quashed wireless check-in at JFK after the airline took over an entire terminal there starting last Thanksgiving. It turned out agents could move people along faster at its 40 counters. "If it doesn't make you efficient, it's not cool," he says.

Much of this IT strategy is transparent to the traveler. Heavy automation keeps costs low so customers can pay low fares and still enjoy leather seats and real TV ("the opiate of the traveler," jokes Neeleman). The paperless cockpit allows pilots to calculate the weight and balance of their own plane in a few keystrokes rather than relying on dispatchers at headquarters to crunch the numbers, which helps to keep planes on schedule (and saves an estimated 4,800 hours a year).

But other IT innovations are more visi-

ble, such as the simple queue program that lets the next person in line at check-in know which agent is available, adjustments to the Open Skies system to keep average check-in times under a minute, and electronic bag tagging. And the hidden cameras in the cabin with monitors in the cockpit, installed recently as a security measure, is another IT project that pleases passengers. "We used the DirecTV technology we already had, and the plumbing on that was \$70,000 per airplane," explains Barger. "What was the ROI on that IT investment? Zero. But we think it's something that will make customers say, These guys just get it."

In the end, IT's effect on customer service may be almost as important as its effect on CASM. "The customer experience is our biggest success factor," says Neeleman. "That's what's surprised me the most: the amount of customer loyalty we have after being around just two short years." And that's not just CEO braggadocio. JetBlue filled 78 percent of its planes last year (industry average is 71 percent), landed the number-two spot among economy airlines

number-one cost, which is labor," says Barger. "It allows us to do more with fewer people, and it also allows us to take better care of the people we do have." And in this heavily unionized industry (more than 60 percent of airline employees belong to one), it has allowed JetBlue to remain union-free so far.

Up in the Air

JetBlue's continued commitment to technology was crystal clear following the post-Sept. 11 turbulence that rocked the airline industry. Just eight weeks after the terrorist attacks, Cohen resumed IT spending, even scoring some savings. "There were great values to be had because vendors were really hurting. And we were capable of making some incredibly great deals because we had really boned up on cash," Cohen explains. And at a time when other airlines cut or level-funded their technology spending, JetBlue's IT 2001 capital budget of \$5.6 million grew to \$10 million in 2002.

Upcoming projects include: onboard servers and wireless networks in jetways so that operational and mechanical data can

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long, smooth ride. "At the moment, they're successful. But no airline is a long-term success story," says Michael Boyd, president of The Boyd Group, an Evergreen, Colo.-based aviation business consultancy.

There are systemic challenges to a low-fare carrier like JetBlue. Will the systems it has installed scale with a company that just raised another \$158 million through its IPO and plans to buy a new \$52 million Airbus A320 every five weeks through 2007? Can it stay efficient as it adds new destinations? As airplanes age? If unions come aboard? Won't established carriers (or another upstart) try to best JetBlue at its own game?

The company's early IT strategy decisions will continue to bring benefits for the next several years, says aviation consultant Klaskin. "When you start out small, you could actually operate by doing everything manually or putting in some single-use software systems. Or you could install cool, integrated technology that will cost you a lot more to start. That's what JetBlue did. And a few years from now, that technology will really start to pay for itself."

JetBlue leaders say they believe Klaskin's view is the right one, though Cohen acknowledges, "It's one thing to build a great organization and a great IT infrastructure, but it's much, much harder to continue to make it a better organization and make it a better infrastructure."

And Barger says JetBlue's IT emphasis won't flag as revenue hits \$1 billion by next year or 2004. "Some people say airlines are powered by fuel, but this airline is powered by its IT infrastructure. We're always looking at our technology and saying, Is there a way we can improve this? That's the magic." **CIO**

Senior Writer Stephanie Overby can be reached via e-mail at soverby@cio.com.

At a time when other airlines cut or level-funded IT spending, JetBlue boosted its budget.

in the Zagat 2001 airline survey, and ranks first in the Air Transport Association's metrics for on-time performance and fewest mishandled bags.

"JetBlue is the way flying should be, and probably the way it was some time ago," says Albert James, a New York City-based application architect who flies to Florida at least twice a year on the carrier. "The agents at check-in are efficient. In flight, you get first-class service no matter where you sit. Even baggage claim is a breeze. I have yet to have a bad JetBlue experience."

JetBlue executives insist that the IT projects that make customers happy also benefit employees. "IT has made a huge impact on our

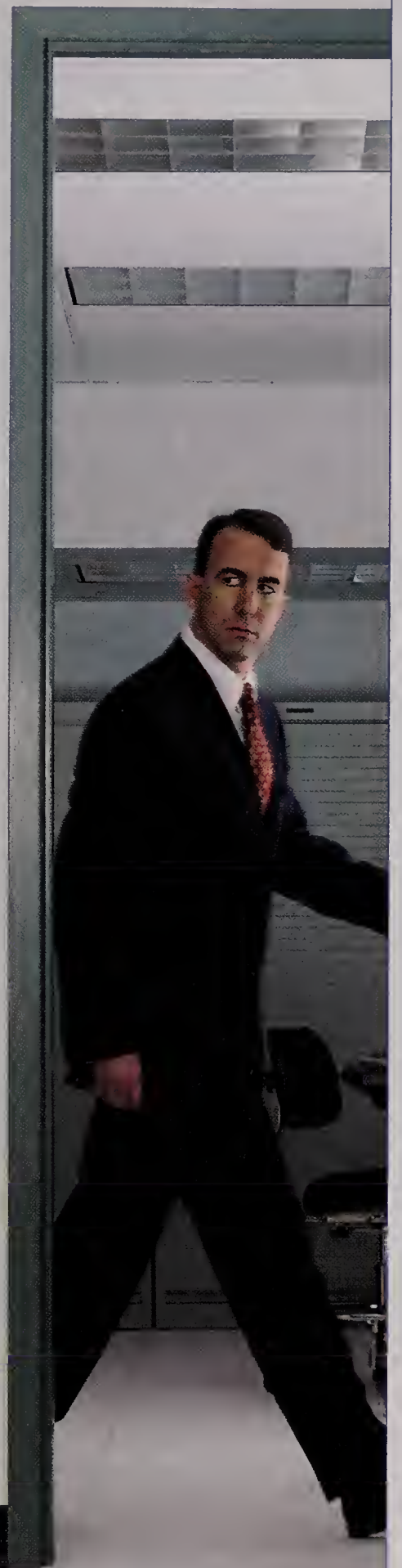
be uploaded and downloaded pre- and post-flight; outfitting mechanics with ruggedized laptops; a paperless frequent flier program. Two security-related programs are also on tap: cockpit-monitoring cameras so that ground crews can monitor activity there via an existing satellite feed, and biometrics applications in airport terminals.

Barger says he emphasizes experimentation in talks with Cohen. "I say to Jeff, 'Let's find out what we can do next in terms of passenger check-in, talking electronically to the airplane itself and talking to one another. Let's keep pushing the envelope.'"

Those are exciting words, but the airline industry is a tough field for those seeking a

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A grassroots **wireless LAN** movement is rolling onto the networks of unsuspecting CIOs. It might already be too late to stop its spread, but it's not too late to make it secure.

BY SARAH D. SCALET

cheap, cool, and dangerous

Something had been bothering Peter Johnson ever since last November, when the announcement of security flaws in the standards used for wireless LANs boomeranged his wireless project for the U.S. Army back to the drawing board. It wasn't that the initiative was delayed several months while Johnson bought encryption technology. It was those ads in the Sunday newspaper fliers for cheap wireless LAN hardware on sale at your local electronics store.

"The average person buys it because they say, 'Hey, I can run my computers off of one network'" and one Internet connection, says Johnson, former CIO of the Army's Program Executive Office of Enterprise Information Systems in Fort Belvoir, Va. "The technology is great. It's inexpensive. But this technology that's being sold for a couple hundred dollars doesn't come with a big red sticker that says, 'Warning, this is really insecure.'"

Reader ROI

- ▶ Find out why wireless LANs are sprouting up everywhere
- ▶ See how to handle rogue wireless LANs
- ▶ Learn how to work around the security flaws

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Welcome to the dark side of a technology that's actually cheap and easy to use. Whether or not CIOs like it, wireless local area network (WLAN) devices are being carried two-by-two into home and corporate offices by employees who see ads like those and don't know that the security of the devices is flawed. By Gartner's estimates, one in five companies has a wireless LAN that the CIO doesn't know about, and 60 per-

cent of WLANs. Anyone with the right hardware can eavesdrop on network traffic or freeload Internet access. More seriously, a hacker could gain network access not just to the Internet connection but also to network resources. (Best Buy, for example, stopped using its 802.11b wireless cash registers this past spring after a hacker claimed to have stolen credit card information from the systems.)

By Gartner's estimates, one in five companies has a wireless LAN that the CIO **doesn't know about.**

cent of WLANs don't have the most basic security functions turned on. Meanwhile, airports and Starbucks coffee shops are pushing wireless access, and a growing number of neighborhood associations and even just neighbors are offering public Internet access—grassroots-style—by installing wireless transmitters. All the user has to do is plug in a cheap network card, log on and start surfing.

"It's just so cool," gushes Gartner's John Pescatore, describing a recent conference where Cisco Systems gave every attendee a wireless network card—and left the security up to individuals. People e-mailed Pescatore questions during a speech rather than raising their hands. Maybe they turned off file-sharing in their operating systems and used a virtual private network to secure their laptops. Maybe they didn't. But they ate up the technology like jelly rolls at break time.

"It's not the IT shops leading the way," says Pescatore, who works from Gartner headquarters in Stamford, Conn. "It's the users." But (and you saw this coming, right?), it's the IT shops that ultimately must lead the way to better security.

Look, Ma! No Privacy!

What are these WLANs that everyone is talking about? Governed by the 802.11 set of standards created by the Institute of Electronic and Electrical Engineers (IEEE) in New York City, WLANs transmit data not by wires but by radio waves, in frequencies that don't require a license (2.4GHz and 5GHz). Setting up a WLAN is a little like plugging a cordless phone base into the telephone jack in a home office, then placing several cordless phones around your house to share that one jack. In WLAN parlance, the base is called an access point (and costs from \$200 to \$1,000), and the receiver is a wireless network card (which costs as little as \$70). The end result is just plain neat. (Look, Ma! No cords!) But the signal can also be picked up by a neighbor using nothing more than a similar \$100 wireless network card.

For that reason, security experts have always been leery of

The IEEE tried to solve those problems by building security into the 802.11b standard (also known as Wi-Fi), with an optional encryption capability known as wired equivalent privacy (WEP). The first problem was that the majority of WLAN users didn't bother to even turn on WEP. Then, last February, three researchers from the University of California at Berkeley announced that even when used properly, WEP was insecure because the security algorithm had weaknesses. A hacker who captured as little as 10 to 20 minutes of network traffic could decode the encryption scheme. That done, he could read all the network traffic he had captured and, until the next time the WLAN user changed the WEP key, he could also gain network access.

After the announcement, organizations with high security stakes—the Army, for example—banned WLANs without additional security, and everybody expected WLAN sales to collapse, at least until the IEEE hammered out new security protocols. But sales didn't drop off. In fact, quite the opposite has happened. The Meta Group predicts that by the end of 2002, 75 percent of Global 2000 companies will have trial WLANs.

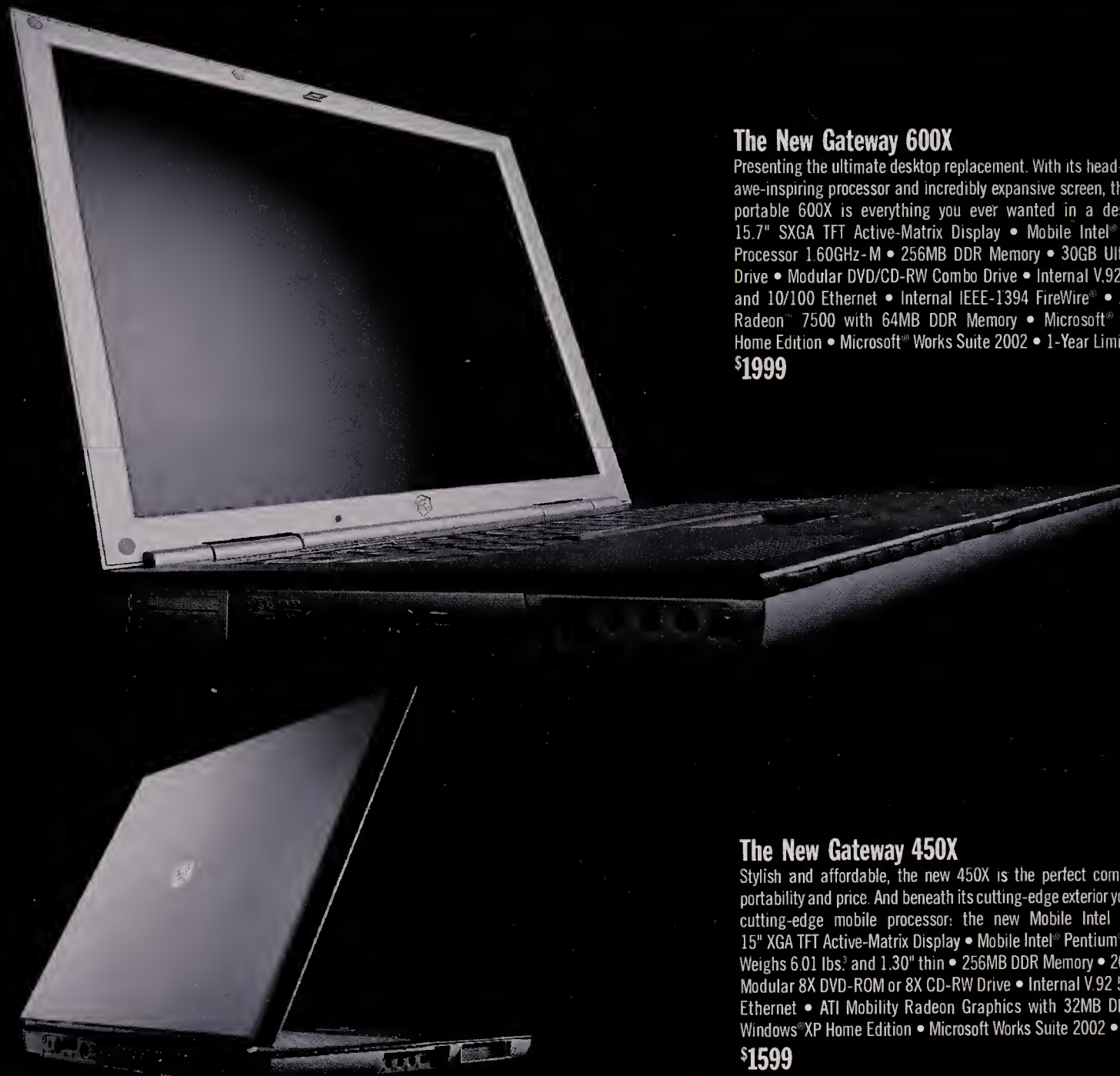
The good news is that there's no reason for WLAN security flaws to keep most businesses from enjoying the convenience of WLANs. But first, CIOs must know what they're dealing with.

The Hunt for Rogue WLANs

Joseph Magee used to be a CIO's most irksome problem: an MIS guy who brought WLAN equipment into the office just to play with. "Little does [that person] know that that signal sitting right there on his desk can easily be sniffed," says Magee, referring to the process of monitoring the airwaves for WLAN traffic.

"I was that guy once," admits Magee, a former chief security officer at an online brokerage who is now CSO at Top Layer Networks, a network security company in Westboro, Mass. "I looked at what I plugged into on my screen, and a big finan-

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cial corporation's name popped up on my laptop, and I looked across the street and saw their building. It freaked me out."

The tools that hackers or curious interlopers use to look for WLAN traffic can help with defense as well. By using tools such as NetStumbler, a Windows utility, or IBM's Wireless Security Auditor, CIOs can find out whether there are any rogue wireless LANs at the office.

They might be surprised, says Meta Group Senior Research Analyst Chris Kozup in Burlingame, Calif. "I've had customers who've done this, and one CIO found 27 rogue access points. That's just one example," he says. And that's just access points, each of which typically has 10 users.

Not only can an audit for WLANs help locate rogue installations, it can determine how far the WLAN signal is transmitting. Into the hallways? Out in the parking lot? Down the street? If the signal is stronger than it needs to be, the amplification level often can be turned down, or the device can at

users leave the SSID at its default settings, which can be looked up online, so administrators should be sure to change the default.

OPTION 2 **Segment the WLAN from the rest of the network.**

If the data passing through the wireless LAN isn't sensitive, it may be enough to separate the traffic from the rest of the network. That can be done with firewalls, treating the wireless access point like any other router.

Another related option is a virtual LAN, which partitions the network and allows certain users to access only certain resources. That's the solution at Paul, Hastings, Janofsky & Walker, an international law firm based in Los Angeles, where in a few new conference rooms visiting clients can use free wireless Internet access. When a visiting user boots up a laptop with a wireless network card, it identifies a WLAN connection and a message appears: "Welcome to Paul Hastings' virtual network.

The good news is that there's no reason for WLAN security flaws to keep most businesses from enjoying the convenience of WLANs.

least be placed away from a window (which doesn't block a wireless signal as well as a wall).

Beyond that, CIOs have five main options in deciding what to do about these WLANs, depending on the sensitivity of the data and how the wireless devices are used.

OPTION 1 **Make the best of what's there.**
Even though the security built into 802.11b devices is flawed, it's better than nothing. Simply enabling WEP can go a long way to improving security. Companies that are relying on WEP for keeping out snoopers will also need strict policies to make sure the key gets changed daily—at the minimum.

A couple of other built-in features can help with authentication too. One is the media access control (MAC) address. This is a unique address written into the firmware of a network card. An administrator can configure the network so that only certain MAC addresses can log on. (The weak link? A hacker can watch the airwaves for a successful log-on, change his own MAC address on his computer or laptop and then gain network access.) The second is the service set identifier (SSID), an alphanumeric ID hard-coded into a wireless device. If the client doesn't have the same SSID as the server, access is denied. Most

Please click here for Internet access"—a modified version of the message coffee-slurpers get when they access the for-pay WLANs Starbucks has installed at many locations.

Theoretically, anyone nearby could get free Internet access, although CIO Mary Odson says the signal degrades noticeably near the windows, and even inside the building.

OPTION 3 **Encrypt data end-to-end with a VPN.**
Within the next two years, Odson anticipates that her attorneys will also use WLANs regularly for accessing the network. In fact, she's so sure of this that as Paul Hastings designs new offices, she's spending less money on cabling. For transmitting sensitive legal documents and e-mail, she'll use a combination of virtual private networks and encryption, treating each attorney as a virtual user even if he is in the office.

For that scenario, even an improvement on WEP wouldn't work. WEP encrypts data between a wireless network card to the access point; a VPN encrypts data end-to-end. That kind of setup is already common in corporate America, especially for mobile employees. It isn't a perfect option, of course. Not only are VPNs expensive and difficult to scale, but they also limit IT's control over the data transmitted over the network,

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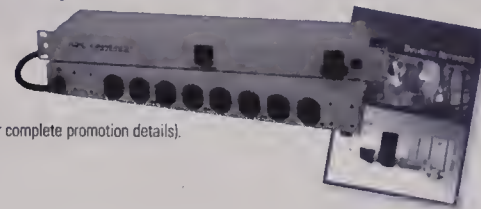
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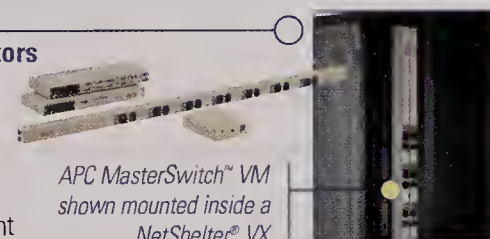
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says Meta Group's Kozup. But he adds that this is still the option most organizations are choosing for securing their WLANs.

OPTION 4 Find a proprietary solution. There are other proprietary wireless solutions for CIOs who aren't content with these options. Major WLAN hardware vendors, including 3Com, Cisco and Enterasys Networks, are adding extra security capabilities into their products. Among them, Cisco's LEAP (light extensible authentication protocol), which automatically changes the WEP keys in less time than it would take a hacker to decode them, has gotten the most attention. Other companies known as wireless LAN gateway vendors—Bluesocket and Vernier among them—sell centralized servers that perform authentication, encryption, and handle additional management and security details.

The Army went the proprietary route. By the time you read this, it should have begun rolling out 11,000 access points that will connect 85,000 mobile Army users during the next four years. The Army's project is unique, not only because it car-

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and advanced encryption system (AES), which committee member Greg Chesson calls a super-scrambler. For WEP to be secure, users need to change the key every 200 packets of data or so, says Chesson, director of protocols at Atheros Communications, a Sunnyvale, Calif.-based company that makes

chipsets for wireless LAN devices. In comparison, TKIP would require key changes every 30,000 packets, and with AES, users would need to change the key only every few billion packets.

The standards draft could be ratified by the end of 2002, with products starting to appear several months later, but Chesson is cautious of setting a date. "It's pretty rambunctious. It's a lot like the U.S. Congress," he says of the IEEE meetings, describing heated discussions, a bog of details and votes based on party (vendor) lines. Meanwhile, for develop-

There's **no guarantee** that the new security standards won't eventually be proven as flawed as the first.

ries sensitive information about battlefield logistics but also because the access points aren't permanently installed in an office. Instead, the access points are radios that travel along with troops. Each access point talks to a workgroup bridge that has computers cabled to it. The information on the WLAN is also encrypted using AirFortress devices from Fortress Technologies in Tampa, Fla.

Johnson won't give specifics, but he admits that the solution was expensive, which was especially painful because the WLAN project was already underway before he knew he'd need to purchase extra encryption. "Obviously we would have liked to use the native encryption within the radio" as planned, he says. "But since that is not doable we have had to incur the cost to put the device into the system."

OPTION 5 Wait and see. The trouble with proprietary solutions is that they are proprietary, and CIOs may find themselves locked into one vendor. Optimists hope that real security can be built back into WLAN devices some day. The IEEE is working on it. Standards currently in draft form would add two more levels of optional encryption: temporal key integrity protocol (or TKIP), a new version of WEP;

ment purposes, Atheros has already let WLAN hardware vendors get their hands on updated chipsets that incorporate parts of the new AES security protocols. Analysts recommend that before making a purchase decision, CIOs should make sure that a vendor will be able to migrate to the standards once they are ratified, as Atheros promises.

Even then, though, there's no guarantee that the new security standards won't eventually be proven as flawed as the first. That's why plenty of testing and planning is in order. In Atlanta, the United Parcel Service is rolling out a WLAN project that processes nothing more sensitive than tracking information, and using that project as a test bed for how laptop users might also use WLANs.

"If you read some articles, it sounds like everything is solid and all there," says John Nallin, vice president of information services at UPS. "However, they're not always that solid. If that was the case, we wouldn't be testing it in our facilities, we'd just be plugging it in. When it's performing at the level we think it should be, we're going to utilize it because we do see the advantages." **CIO**

How are you securing your WLAN? E-mail Sarah D. Scalet, security editor and senior writer, at sscalet@cio.com.



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The promise of entering the **vast Asian marketplace** has lured **global companies** to Singapore by the thousands. But no matter how Westernized and **business-friendly** the city-state may seem, it's important to remember that it's not home and **the rules are different.**

PHOTOS BY GETTYVONE



**Singapore: The financial district (center).
Leveraging the West to open the East.**



Singapore

BY TOM FIELD

Reader ROI

- Find out what opportunities Singapore offers Western businesses
- Learn the pros and cons of setting up shop there
- See how Singapore stacks up against other Asian business centers

“The Gateway to Asia” is how the marketing brochures promote Singapore. But Brian Chen, CTO of the Infocomm Development Authority (IDA), the government’s own IT shop, offers a more practical description: “Singapore is Asia 101,” he says.

Or Asia Lite. Or Asia for Beginners. As opposed to countries such as China and India, where large labor forces are at least partially compromised by creaky IT infrastructures or cranky governments, Singapore is the plug-and-play marketplace—a super-wired country where, as the Singaporeans would have Westerners believe, the e-business is brisk and the living is easy.

"This is the place you go to get your feet wet in Asia," says Chen, who was born in Fujian Province in China, was educated as an engineer in the United States, and worked for Motorola in China just prior to joining the IDA in early 2000. And as Chen sits in IDA's spacious, elegant lounge in the Suntec City Tower Three in Singapore's Marina district (where pop rocker Christopher Cross had performed two days before), Singapore certainly seems to offer Westerners a home away from home. "It's an easy adjustment," Chen concludes.

Singapore has attracted Western interests since 1819, when Sir Thomas Stamford Raffles of the British East India Co. stumbled upon the tiny island (246 square miles) and quickly established it as a trading post for the British Empire. With its central location (a short swim south from Malaysia) and its deep har-

bor, Singapore by 1869 had become a thriving port for Western coal merchants, ship builders and traders.

Fast-forward to the 1990s. Not only had the port become the biggest, busiest, most IT-savvy in the world (see "The Port of Singapore" on Page 96), but the city-state was now home to thousands of multinational companies, including Citibank, Microsoft and Sun Microsystems—the East India Companies of the late 20th century, looking to take advantage of the following:

- A stable, business-friendly government offering huge tax incentives (10 years 100 percent tax free if a business establishes a regional headquarters) and local partnerships.
- A largely English-speaking, Westernized environment complete with shopping malls and U.S. restaurant chains.

Singapore Speed Bumps

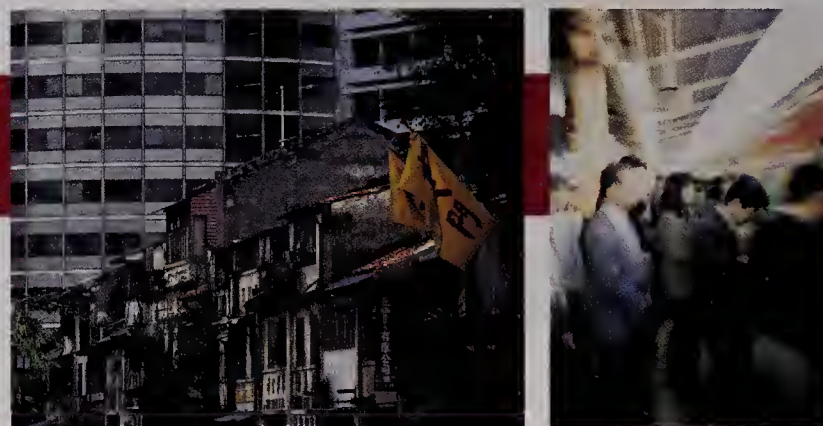
Singapore poses some stiff challenges to global companies and their employees. Here are the issues to consider before setting up shop.

The government giveth...and taketh away. The voting privilege in Singapore is universal—and compulsory. A citizen who fails to vote is stripped of the right to vote for five years.

In other words, Singapore gives people and businesses freedom to do what they're told. The financial services and high-tech industries are lightly regulated, and the telecommunications industry was completely privatized in 2000. But this is still a restrictive marketplace for media and entertainment companies. Journalists must be licensed in Singapore, *Playboy* and *Cosmopolitan* are banned, movies are censored, and the government maintains a list of banned websites that Internet service providers are required to block from Singaporean subscribers.

Labor is scarce. There are currently 116,000 IT jobs in Singapore, with only 106,000 qualified professionals to fill them, creating an enduring shortage of about 10,000 people. It's a seller's market, and IT workers are commanding top dollar—\$24,000 per year on average, which is almost five times what programmers in India earn. Companies increasingly are establishing management headquarters in Singapore and outsourcing the labor to China or India.

The living is easy...and expensive. Singapore has no natural resources, and its man-made ones are scarce too. Housing is



Chinatown in Singapore (left): Ethnic Chinese make up 78 percent of the population. **The commute:** Drivers must win a lottery for the privilege of paying up to \$10,000 for a driver's license.

particularly expensive. Residential space is so scarce, in fact, that about 86 percent of the population lives in government-built and financed high-rise apartments that cost anywhere from \$1,500 to \$3,000 per month. Because of the high cost of living, many multinational companies pay a housing allowance to their Singapore employees.

Office space is similarly scarce and expensive, but the government provides financial incentives and assistance to global businesses opening offices there.

As for transportation, it's relatively cheap if you don't mind taking a taxi or the subway. But the number of cars and drivers is strictly regulated. In fact, prospective drivers must win a lottery just for the privilege of paying up to \$10,000 to obtain a driver's license. Foreigners with valid driver's licenses have an easier time of it; they can apply for a Singapore driver's license after one year of residency.

Of course, because of high tariffs aimed at discouraging private ownership, a midrange car can cost as much as \$100,000. —T.F.

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A Clean, Well-Lighted Place

WESTERNERS MAY LAUGH about Singapore's draconian laws against chewing gum and petty crime (remember Michael Fay, the American teenager who was caned for vandalizing a car in 1994?), but perhaps not coincidentally Singapore's streets are clean and crime-free—and kept that way by a stern criminal justice system that fines jaywalkers, canes petty thieves and executes drug dealers. Also, because the tiny island carefully regulates automobile traffic (cars and driver's licenses are prohibitively expensive), there is no street congestion or air-and-noise pollution, unlike in India or China.

—T.F.

- A sophisticated telecommunications infrastructure, including a state-of-the-art broadband network reaching 99 percent of the population.

- A heterogeneous community of 4 million that's 78 percent Chinese, 13 percent Malay and 7 percent Indian, making Singapore an ideal test market for a good slice of Asia.

"For a U.S. company coming into this marketplace, Singapore is very cosmopolitan, a melting pot of cultures," says Vincent Sim, senior marketing manager for Microsoft's MSN business unit, which opened its Internet portal to Singapore in 2000. In two years, MSN was able to attract 800,000 local e-mail subscribers, and in 2001 it used Singapore as a laboratory to launch a successful series of live concert webcasts. "We find we can test new services in Singapore and then cross-share the learnings across Asia," Sim says.

Of course, along with Singapore's business opportunities come a unique set of challenges, including the following:

- Skilled labor and available housing are both scarce and expensive.

- The government is heavily involved in everything from recruitment to regulation—that is, it's your business partner, like it or not.

- The business-friendly government is not so friendly in other ways; it restricts expression, entertainment and political dissent to a degree that feels oppressive to most Westerners.

But despite those problems (see



The Old Courthouse. Singapore's streets are notably congestion-free.

"Singapore Speed Bumps," Page 90), Singapore today is host to about 6,000 multinational companies, all seeking the seemingly unlimited opportunities presented by the legendarily promising Asian market. What experienced global players have learned is that the key to getting good grades in Asia 101 is to know the rules of engagement with Singapore's government and culture, to develop local partnerships, and to work around the island's challenges.

Who You Know Tells How Far You'll Go

Business partnerships are valuable anywhere, but in Asia, where long-term relationships are revered, who you know very much affects how far you'll go. Singapore's IDA has developed a partnership model designed to help multinational companies

gain a toehold in Asia and give homegrown companies an entry into the global marketplace.

The Infocomm Local Industry Upgrading Programme (iLIUP, pronounced like *eye loop*) is the cumbersome name of this program, an initiative that tries to pair local entrepreneurs in joint ventures with multinational companies. The objective: to blend the technology, know-how, and sales and global marketing power of the multinational companies with the man power, entrepreneurial energy and local market knowledge of the homegrown enterprises. Since iLIUP started in 1995, roughly 160 Singaporean companies have been assisted by 20 multinational mentors (17 of them from the United States) including Apple, Compaq, IBM and Oracle.

Among the current participants in iLIUP are Sun Microsystems and iGine, an up-and-coming Singapore-based vendor of e-commerce software. For more than a year, Sun and iGine have been united in a partnership that serves both companies' business needs. The first fruit of the relationship is Web2Biz, a new e-business engine developed by iGine for Sun's partners and customers. According to Philips Lai, strategic business development director for Sun's global sales organization,

Wired in Singapore

61% of homes have a personal computer.

75% of the country is served by cell phones.

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WeB2Biz has helped cut Sun's order-processing time from 12 minutes to 15 seconds. And by leveraging Singapore's state-of-the-art telecom infrastructure, Sun has been able to test new Java and wireless products that can't yet be deployed in most of the world. "[This partnership] gives us access to new markets, new technologies and new offerings," Lai says.

But there's a bigger picture here. Clearly, for a company like iGine, a partnership with a brand name like Sun is a once-in-a-business-lifetime opportunity to take its show out of Singapore and mount it on the world stage. For Sun, iGine presents a red-carpeted chance to establish an intimate relationship with a homegrown Asian company that in turn can give Sun the credibility, experience and references it needs to penetrate the entire Asia-Pacific marketplace.

"Doing business in Asia is not easy," says Chang Huong Tan, CEO of iGine. "The opportunity is here, but if you don't get into the right relationships, [market penetration] can't work at all. And these relationships can take years to develop."

Sun's Lai agrees that the iLIUP partnership pays dividends throughout Asia. "Other countries look at

what happens in Singapore," he says. "A strong reference from here does help. It's a door opener."

Please Come to Singapore

Suresh Prabhu, chairman of Apex Systems, an insurance industry software vendor with offices in India and Singapore, strongly encourages global leaders eyeing his marketplace. "Don't look at coming to Asia as a pain in the butt," he says. "Look at it as a way to expand your business."

Yes, the governments, cultures and customs impose barriers, he says, but not insurmountable ones, not when weighed against the benefits of entering the Asian marketplace and leveraging local resources.

"Look at what's possible in Asia that will help your bottom lines," Prabhu says. "Look at the skills available in places like Singapore and China."

All success requires, says Prabhu, is "a mind-set change."

Former Executive Editor for Community Development Tom Field is an old Asia hand who contributed to *CIO*'s Dec. 1, 2000, Field Report on India.

Island Net

How Singapore is leveraging a broadband network that connects 99 percent of its homes

E-services: Through its government-developed eCitizen Web portal, Singapore is migrating all its public services online. The goal is for citizens to have one-stop access to everything from birth registrations to retirement fund information. Singapore hopes to have 99 percent of those services consolidated online by 2004. Today, more than 500 e-services are available via the Internet and at eCitizen kiosks in community centers throughout the island.

E-business: Singapore is attempting to find an electronic means of cutting through red tape for businesses that want to set up shop, obtain permits or merely pay their taxes. The first hurdle, cleared in 2001, was creating a one-stop portal for new businesses to register in Singapore. Before, they had to spend weeks visiting offices and obtaining permits. Now they can register online and receive everything they need within three to five days. The fees for registering a new business have been cut from up to \$1,700 to \$150.

Through the Singapore One broadband network, subscribers



There are more than 500 public services available via the Internet at eCitizen kiosks.

can sign up for a movie-on-demand service that gives

them access to a large video library. For roughly \$2.50, viewers rent these films for 24 hours, and they can fast-forward, rewind or replay them several times over—anything but legally record them.

Clearly, Singapore had some advantages before deploying e-services. This is a small island (246 square miles), after all, and the telecommunications infrastructure was already modern and sturdy. Few other countries, much less the United States, could hope to duplicate those initiatives today.

But a U.S. city, county or even state could. The keys to success are to have a strategy for scaling up before you launch and then to find a balance between supply and demand.

"You don't want to create 1,000 users and then have nothing for them to use," says Daneel Pang, the Infocomm Development Authority deputy director of content development. —T.F.

Asia Scorecard *How does Singapore stack up against its neighbors?*

	Population	Labor Force	Per Capita Income	Average Salary for IT Programmer	Office Rent Per Square Foot	Value of IT Market	Estimated # of PCs	Internet Penetration
Singapore	4M	2.2M	\$24,740	\$24,000	\$45	\$3.4B	1.9M	44%
	NOTE: Easy to relocate and set up shop here but hard to find skilled labor. Even native Singaporean companies are increasingly outsourcing IT work to India.							
Australia	19.3M	9.2M	\$20,530	\$32,000	\$39	\$12.8B	8.9M	46%
	NOTE: Since 2000, the government has spent or budgeted \$5.3 billion on IT industry innovation and education.							
China	1.3B	705M	\$840	\$4,750	\$36	\$19.9B	2.6M	2%
	NOTE: Language barriers, human rights issues and government restrictions inhibit global industrial growth.							
Hong Kong	6.8M	3.4M	\$25,950	\$45,200	\$81	\$2.9B	2.4M	35%
	NOTE: Like Singapore, Hong Kong promotes itself as an Asian IT center and gateway to China. But also like Singapore, it suffers from an IT staffing crisis.							
India	1B	450M	\$460	\$5,850	\$28	\$4.6B	4.6M	1%
	NOTE: Top-notch IT labor force is ideal for outsourced services; government regulations and poor national infrastructure inhibit physical growth.							
Japan	127.1M	67.6M	\$34,210	\$44,000	\$155	NA	40M	37%
	NOTE: Japan felt a double-whammy from U.S. and Asian economic crises. Internal report criticizes country for lagging behind major industrial nations in government and business use of IT and the Internet.							
Philippines	76.5M	32.6M	\$1,040	\$6,550	\$20	\$1B	1.5M	6%
	NOTE: Good news is that the IT outsourcing industry is attracting more business. Bad news is that terrorism may be scaring away prospective customers.							
Vietnam	77.8M	33M	\$390	\$7,200	\$21	\$1.4B	700,000	.12%
	NOTE: Vietnam continues to privatize, but interest from foreign investors may be waning. Direct foreign investment has slipped from \$8.3 billion in 1996 to \$1 billion through the first half of 2001.							

SOURCE: FACTBOOK ON THE TELECOM AND IT INDUSTRY IN ASIA, JANUARY 2002, PRODUCED BY TELECOM ASIA AND WIRELESS ASIA IN COOPERATION WITH ASIA MEDIA ALLIANCE
ALL FIGURES ARE PROVIDED IN U.S. DOLLARS B=billion M=million

The Port of Singapore

How does the world's busiest, most IT-intensive port retain its first-mover advantage? By being a second-mover too.

BY TOM FIELD

Robert Yap, executive vice president of IT for PSA Corp., the company that developed and operates the port of Singapore, holds the top IT job at the busiest and largest container port in the world—a great job, but not without its worries.

Yap's port handles 250 shipping lines with connections to 600 ports in 123 countries, and daily sailings to every major port on the globe. Its calling card is efficiency; its backbone is IT. Because of the Computer Integrated Terminal Operations System (CITOS, a proprietary ERP application) and Portnet, an e-business system that provides paperless one-stop shipping for the port and its customers, PSA believes that technology is the basis of the port's competitive advantage. And it has been since 1984, when the first version of Portnet was introduced. Today, Singapore's port enjoys first-mover status as the world's IT leader in seaport logistics and operations.

But What About Tomorrow?

"I'm a firm believer in the second-mover advantage," says Yap, an Australian-educated business historian born in Malaysia who headed IT at Philips Electronics Asia-Pacific before joining PSA in 2000. "The first-mover is the one who creates the breakthrough," Yap says, quoting theory from his favorite professor, F. Warren McFarlan of the Harvard Business School. "But it's the second-mover who builds the business," he says. "We'd like to be both."

Has that ever been done? It can be argued that the Walt Disney Co. was a first-mover in animated films and theme parks, slipped and then rebounded to regain substantial margins in both markets. And Yap believes that Charles Schwab, which branded the online brokerage business and then awoke a sleeping giant in Merrill Lynch, ultimately will come back to own the marketplace. "But



they've got to stay ahead of the curve," he says.

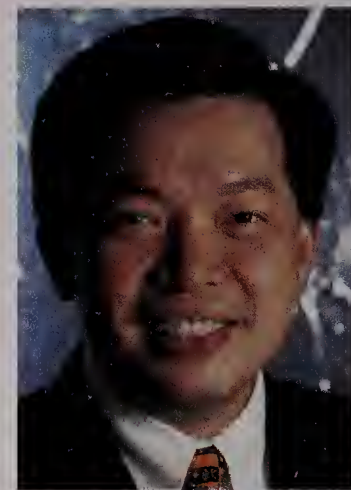
As does his port, which finds the edge of its technological advantage narrowing because of the ubiquity of IT applications in its industry. Accordingly, since 1996 PSA has focused not just on improving its own internal systems but in expanding its operations throughout the world—buying shares of rival ports and turning them into franchises that grow the PSA brand. Today, PSA participates in joint ventures with 13 ports in eight countries throughout Europe and Asia, and it has established a subsidiary company, Portnet.com (of which Yap is CEO), to market and sell Portnet to other ports worldwide. The latest customer is the port of Seattle, PSA's first U.S. customer.

By constant expansion, PSA intends to ensure that its systems remain the industry standard. With a proprietary system in every port (figuratively speaking), what rival could hope to compete?

"I don't see any," Yap says. "But the challenge isn't building the application; it's who really has the innovative idea."

By spreading its technology globally, PSA has, for the time being, maintained its edge.

And that's Yap's plan. **CIO**



Robert Yap is in charge of IT at the port of Singapore (above), the world's busiest: "The challenge isn't building the application; it's who has the innovative idea."

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Fortune Telling

New predictive intelligence tools may clear cloudy futures

BY DAVID L. MARGULIUS

Edited by Christopher Lindquist. Send your thoughts and ideas for future columns to clindquist@cio.com.

WHAT TYPE OF PERSON takes a midweek ski trip? American Skiing Co., which operates eight ski resorts in the United States, needed to find out. Its flagship East Coast resort, Killington in Vermont, was full on weekends but emptier

midweek, and it was clear that untargeted marketing wasn't going to fill the chairlifts.

Together with Newburyport, Mass., startup Genalytics, American Skiing combed its customer database for the answer. Applying what it calls

Organic computers...Nanotech...Predictive intelligence

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"Darwinian genetic algorithms," Genalytics created more than 50,000 predictive test models for American Skiing in three days, each emphasizing different combinations of variables, such as travel time or number of kids. The software then took the most predictive models and "mated" them to "breed" even more insightful models.

The exercise showed that the customers most likely to visit Killington midweek were those who had never visited the company's western resorts—such as Steamboat in Steamboat Springs, Colo.—presumably because skiers tended to spend a week at Steamboat, thereby using up their midweek vacation days. Based on this finding, the

cheaply analyze huge amounts of data, examine more variables, uncover previously hidden relationships and deliver startlingly accurate predictions without hiring a roomful of white-coated PhDs.

"The technology for processing has gotten remarkable," says Stacie McCullough Kilgore, a senior analyst at Cambridge, Mass.-based Forrester Research. "This really changes the nature of modeling."

Across large enterprises, predictive intelligence technology is being used for a stunningly broad set of applications. Sports teams are using it to predict when star athletes might get injured. Banks use it to detect money laundering and insider trad-

and neural networks, along with workflow-based mechanisms that allow for human input into forecasts.

"Predictive intelligence requires a fluid combination of multiple technologies," explains Bob Moran, an analyst at Aberdeen Group in Boston. Most of the algorithms search for patterns in large amounts of data. Survival analysis, for example, looks at factors leading up to an event such as an engine failure. Many of the algorithms fit in the broad category of probabilistic or stochastic modeling—they look at the probability that a specific event or combination of events will have an impact on the future.

The new models can often run right on top of an existing transactional system or data warehouse, rather than requiring a separate database and ETL (extract, transform and load) process. Many also claim to be adaptive, or self-tuning, to avoid the need for constant care and feeding from a large professional staff.

Across large enterprises, predictive intelligence technology is being used for a stunningly broad set of applications.

company stopped marketing midweek Killington packages to those customers and instead started offering more synchronized cross-promotions between Killington and Steamboat. (And like most predictive intelligence users, the company refuses to discuss actual results, for competitive reasons.)

"The ability to be iterative was crucial," says Diane Murphy, former director of database marketing for American Skiing in Bethel, Maine. The new fast-modeling technology helped avoid misleading indicators and helped get to a truly predictive result at a manageable cost.

Power Surge

Welcome to the realm of predictive intelligence, a new generation of analytical applications that are leveraging faster processing speeds, more complex algorithms and existing data mining infrastructures to help enterprises push back the fog of the unknown. Although statistical forecasting has been around for decades, what's changed is the ability to quickly and

ing. Retailers are forecasting demand down to the store and item level. Manufacturers use it in product design and to forecast equipment failure. Drug companies use it to develop drugs and then figure out what marketing programs will cause doctors to write more prescriptions.

"Most of the traditional systems companies have used have not been able to draw correlations to other external factors," explains Kilgore. With this new technology, a retailer that traditionally made forecasts based on last year's sales, for example, can now factor in external variables such as the opening of a competitor's store a couple miles away. And a boxing promoter looking to predict attendance might run a model incorporating weather and economic indicators along with the prominence of the fighters.

With academic-sounding names like support vector machines, these new predictive intelligence techniques and algorithms are often used together with older approaches, such as regression analysis

New Names and Old

Predictive intelligence software and services come from a slew of startups like DemandTec, Genalytics and Mantas that are focused on particular applications such as financial fraud detection, supply chain demand visibility or retail forecasting. Traditional analytics vendors such as Hyperion, SAS and Teradata also have predictive offerings, as do applications vendors such as Computer Associates, Epiphany, Manugistics and PeopleSoft.

In fact, more predictive analytics capabilities are appearing under the hood of packaged CRM, ERP and SCM applications, where they're accessible to a broad set of users who previously relied on spreadsheets, gut instinct or a separate analytics department. "What's new is the packaging of predictive technology in a business

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process context," says Henry Morris, IDC analyst and vice president of research in Framingham, Mass. (IDC is a sister company to CIO's publisher, CXO Media.)

The dramatic failure of traditional supply chain analytics to predict last year's demand downturn has spurred a lot of thinking about how to go beyond just extrapolating from the past. Startups such as eIntelligence, OneChannel and Spotfire tout their ability to combine human collaborative input with advanced modeling to create scenarios for better visibility into

good data inputs, and having people who can understand the models and help translate their output into action.

"You need to take it a little bit at a time, set some short-term objectives and understand exactly what you're looking to get out of it," says Allen Brewer, CIO of AIG's e-business risk solutions group in New York City. Brewer's organization uses predictive software from Computer Associates along with homegrown algorithms to evaluate potential credit insurance customers, helping to accurately

A boxing promoter looking to predict attendance might run a model incorporating weather and economic indicators along with the prominence of the fighters.

the demand chain or other forecasting challenges with lots of unknowns.

"When Britney Spears comes out with her new CD, you have no idea how it's going to do," points out Forrester's Kilgore. Given this lack of historical data, models that can take into account potentially significant variables suggested by a knowledgeable human being, such as record company promotions or regional influences, can be effective.

"There's this mental voodoo that people are doing based on some report they print out and bring to the meeting," says Randy Mattran, IS leader for business intelligence at Best Buy in Eden Prairie, Minn., a prospective user of predictive analytics. "We're trying to capture some of that voodoo in the system."

Predicting Success

Customers that implement predictive intelligence technology almost uniformly emphasize three success factors: being clear about the goals of the project, having

predict, for example, three bankruptcies in the first quarter of 2002. He says that without the software, AIG couldn't have entered the midsize business market for its credit insurance products.

Start with a specific goal in mind, users say, and figure out how to frame the problem and which models to use. "Does the model fit? Can you include the relevant variables?" asks Best Buy's Mattran. Focusing on the right data, he explains, is more important than the underlying mathematical algorithm in determining whether "your scorecard improves versus what you did with a mental model and Excel spreadsheets."

Second, focus on getting the right data inputs and on working with clean data, which means having the right cleansing routines and sanity checks on data quality. There are a lot of exogenous variables that most companies don't account for in the data warehouse, says one IT manager at a large manufacturing company, noting such things as data on upcoming

Cool Product

Good and Wireless

STARTUP COMMUNICATIONS

company Good Technology has announced the release of its first product, the Good G100 Wireless Handheld device.

The palm-size communicator resembles a Research in Motion BlackBerry but offers some extra features, including a keyboard with slightly curved keytops to provide the sense of more thumb space and a navigation bar that can be used with either hand. The 4.7-ounce G100 also features a backlit 212-pixel-by-138-pixel screen and a lit keyboard for sending and viewing messages in low light or dark conditions. The screen provides 16 levels of grayscale, allowing users to see more detail in retrieved documents.

The product works with the company's GoodLink wireless data access service that provides two-way, cradle-free synchronization with Microsoft Exchange servers. The G100 communicator can also be used with GoodInfo, which offers integration with corporate data in enterprise applications, such as those from Oracle and Siebel.

Pricing for the G100 hasn't been set, though the company claims it will be competitive with other similar products. Pricing for the GoodLink service varies by implementation. For more information, visit www.good.com.

—Christopher Lindquist



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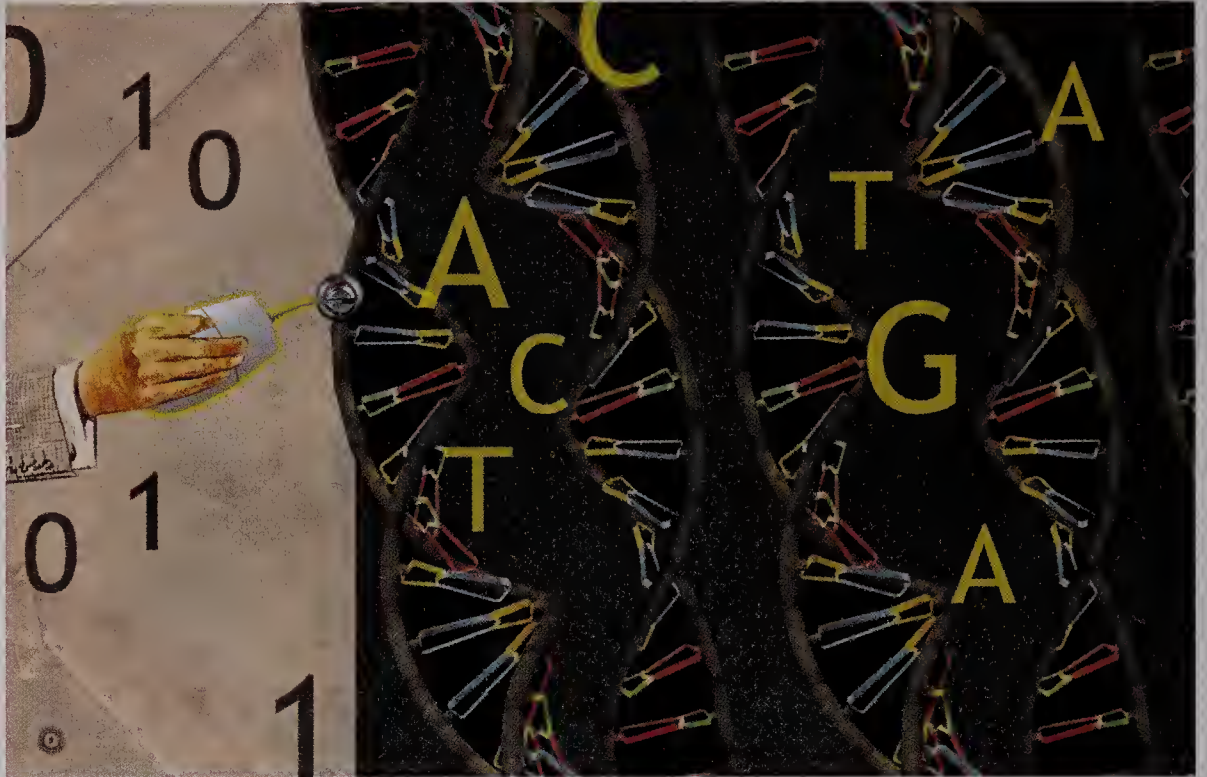
retailer promotions, which may not be routinely fed back into a manufacturer's forecasting system. The manager also notes that making predictive analysis work requires significant up-front investment in providing current data.

And finally, make sure there are people on staff who know how to operate the model, understand the output and are prepared to take action based on it. "Companies should be very leery if they think they can use these tools in-house without any kind of expertise," says Forrester's Kilgore, referring both to modeling experts as well as people who can translate the models into plain English for end users. The models need to be understandable by the managers who will use the output—they can't just be a black box.

"You can't just say, Trust me, it's a fine model," agrees Dreyfus Executive Vice President Prasanna Dhole in New York City, who combined his division's analytics team with sales and marketing to ensure that the results of modeling would get translated into action. "Your data mining or analytical group can be off on a tangent building wonderful models, but then nothing gets implemented."

Dhole's group used predictive "linear and nonlinear models" from SAS to determine why asset redemptions (such as people pulling their money out of mutual funds) at the funds group were higher than industry standard levels. The group also used the models to predict when individual customers are likely to churn so that they can be targeted for special attention. Dhole credits the technology with helping reduce asset redemptions to around 7 percent of assets per year, well below the industry standard. "To a large extent that was because of the success of our data mining and predictive modeling," he explains. "The amount of data you can handle now makes it so easy." ■

David L. Margulius is a San Francisco-based technology analyst and consultant. He can be reached at dave@enterpriseupdate.com.



UNDER DEVELOPMENT

DNA computing

Cellular Processing

THE LATEST COMPUTER to come out of the University of Southern California isn't newsworthy for its small size or computational power. It's notable because it is made from DNA, the microscopic acids that reside in every cell and are responsible for all life. The DNA computer, which more closely resembles a biochemistry lab than a PC, was the first nonelectronic device—including the human mind—to solve a logic problem with more than 1 million possible answers.

Len Adleman, the USC professor who led the research, says that DNA is actually quite similar to binary code. Each DNA strand is made up of some combination of A's, T's, C's and G's that act just like a computer's 1's and 0's. Furthermore, DNA copies, stores and parses information like a human hard drive and processor. "Inside the cell you have all the basic tools," says Adleman. "It's just a matter of carrying out the computation."

The problem Adleman's DNA computer solved involved 20 variables. For example, John wants a car that is red, has a sunroof, four-wheel drive and so on. Adleman's team coded strands of DNA with all the possible answers and then subjected the strands to a series of steps that eliminated ones with incorrect answers until only the strand with the correct answer remained. All in all, it took about two days. On a traditional computer, Adleman says, "that problem would take less than a second. Electronic computers transcended that [kind of problem] 50 years ago."

While the experiment convinced Adleman that DNA computers will never be able to rival their electronic counterparts for speed without an unforeseen scientific breakthrough, he does think that they have a future niche. One day, a DNA computer programmed to react to the presence of a toxin, such as cancer, could be embedded into a cell. When it detects the toxin, the computer would respond by directing the cell to replicate and chemoluminesce or "glow." The glow could be seen with the naked eye allowing for early disease detection and saving lives. Let's see a ThinkPad do that.

—Ben Worthen

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PUNDITS

Thomas N. Theis

Nanotech Revolution

Hype aside, here's what to expect as nanotech grows up

WHEN IT COMES TO MATTER, size really does matter. The properties of materials that we notice—color, hardness, electrical conductivity and so on—all depend on the nature and structure of the constituent atoms and molecules. With increasing ability to design and build on an atomic and molecular scale—a reasonable definition of nanotechnology—we are becoming better and better at developing materials with entirely new properties. Those materials, in turn, become the building blocks for more complex systems and entirely new products.

But when an emerging technology is the subject of as much hype as nanotech, it's easy to tune out and stop listening. That would be a big mistake. If we ignore the unsupported claims and misguided speculation, especially about what might be achieved in the near term—there remain solid reasons to expect significant long-term developments in what the National Science Foundation estimates to be a trillion-dollar-plus industry during the next 10 to 15 years.

Why nanotech? With it, today's supercomputer could become tomorrow's wristwatch personal assistant. Buildings and machines could signal when they need maintenance—and perhaps repair themselves. Our clothing could monitor our health and alert us to environmental hazards. All of these wonders, and many more, are scientifically possible. The difficulty comes in figuring out how and when these things will happen.

The biggest nanotech market now, and probably for some time, is in materials. The use of nanosize particles in products such as cosmetics, sunscreen, paints and a host of

other products is already commonplace. Specialized nanotech startups are emerging in droves, and new industries could grow up around them. Right now, for example, it is difficult to count the number of startups selling carbon nanotubes (the strongest and most conductive fibers known), even though

Potential nanotech applications of sensitive, inexpensive sensors are almost unlimited.

there are, so far, no proven commercial applications of nanotubes. Researchers are also learning to assemble molecule-size components into complex composite materials and “smart” materials. Several laboratories, for example, are developing nanostructured membranes for efficient filtering of pollutants from water or air.

But while materials are essential, it is the prospect of new devices and gadgets that truly captures our imagination. Research on nanosensors, for example, is burgeoning. The potential applications of sensitive, selective, inexpensive sensors are almost unlimited—from medical diagnostics to chemical and biohazard detection. No wonder many startup companies and university research groups are playing in this arena.

Will we someday integrate functional

nanocomponents into the complex systems of IT? In a sense, we already do. Even today, transistor dimensions are measured in nanometers. IBM has shipped more than 5 million disk drives with a new nanostructured magnetic coating (humorously referred to as Pixie Dust), which will allow us to quadruple the data storage capacity of our products.

There are, however, looming obstacles to further progress. First, as the components have shrunk, manufacturing costs have risen. And even if manufacturing costs can be capped, there are physical limits to the minimum size of a useful silicon transistor or the data storage density of a magnetic disk.

That is why many industry and university laboratories are exploring entirely new devices to process and store information. IBM scientists, for example, have been exploring the potential of carbon nanotube transistors. We are certain that these can be made smaller than any possible silicon transistor, and they may beat silicon in performance as well. We are also exploring exotic new ways of storing information. One, a nanomechanical system called Millipede, stores data as minuscule, erasable indentations in a thin plastic film. Millipede might someday allow a trillion bits of information to fit inside a thin wristwatch.

However, don't expect these new nanodevices in your computer right away. Hundreds of millions of transistors are integrated in the latest microprocessor chips. In contrast, last year IBM built a two-transistor logic circuit from a single carbon nanotube—and that was the world's first. It will take some time—probably more than 10 years—to learn how to integrate billions of nanotube transistors into a useful system. But whether or not new nanodevices eventually displace the silicon transistor and the magnetic disk, nanotechnology is the future of information technology. Stay tuned. **CIO**

Thomas N. Theis is the director of physical science at IBM's T.J. Watson Research Center.

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Reality Bytes

A Cold Look at Hot Trends

Summertime and the Books Are Cheesy

Every season is the silly season in the business books field. But summertime is the time to sample them.

BY MEGAN SANTOSUS

NOW THAT IT'S SUMMERTIME and the living is (putatively) easy, it's traditional to shift gears, kick back and pick up a good book. But if you're the monomaniacal, workaholic type that can't imagine ever diverting her attention from the job long enough to sample a mystery, thriller or any other sort of light beach reading, you can dip into one of the myriad business books now available that promise to educate as well as entertain. (And when I say you, of course, I don't mean me. I wouldn't touch any of these books with the proverbial 10-foot pole.)

History Comes Alive

The growing compendium of books about Jack Welch notwithstanding, a current trend in business book publishing is to hold up historical, military and sports figures as paragons of managerial acumen. One of the more intriguing recent selections is *Moses on Management: 50 Leadership Lessons from the Greatest Manager of All Time*, by David Baron and Lynette Padwa. I haven't actually read the book, so I can't begin to fathom how calling down a rain of frogs, afflicting your enemies with boils or parting a major body of water is analogous to

any aspect of running a business. (Although it would certainly be handy. Imagine: one moment your employee is asking for a raise, the next he's neck deep in frogs. Not to mention boils.) Yet the write-up on Amazon.com makes Moses sound like a real management genius, someone who has a lot to teach CIOs grappling with decimated budgets, inchoate strategies and demoralized employees. Moses apparently was a whiz at face-to-face negotiations (having the Angel of Death in your back pocket is, of course, an ace in the hole not available to most CIOs) and a master motivator. He also never saw a crisis he couldn't turn into an opportunity for change management and empowerment. Sounds like a bona fide business guru to me.

If Moses is a bit too far removed from the here and now, maybe Alan Axelrod's *Elizabeth I, CEO: Strategic Lessons from a Leader Who Built an Empire* will seem more relevant to our modern sensibilities. Again, I haven't exactly read it,



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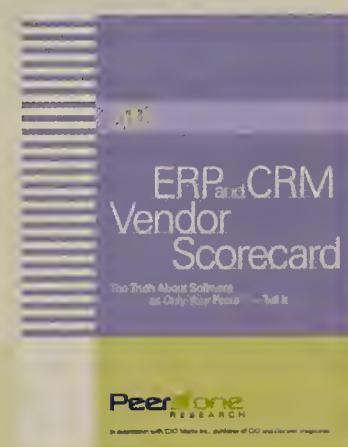
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Report Card Your peers grade the big 4 ERP/CRM vendors' performance on features, ROI, software quality, ease of integration, and vendor services.

Review Reviews of the vendors and verbatim comments from your peers—both pro and con—for each.

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but good Queen Bess sure sounds like a dynamo. As both a coach and mentor, Elizabeth became adept at communicating a coherent management style (Do what I say or I'll have your head cut off) and engendering loyalty (Do what I say or...). Perhaps not coincidentally, she enjoyed a 44-year tenure at the top. Not bad.

As an unmarried, childless, high-achieving executive woman, Elizabeth typifies the dilemma described in *Creating a Life: Professional Women and the Quest for Children*, by Sylvia Ann Hewitt. Hewitt profiles women who spend all their time

Moses apparently was a whiz at face-to-face negotiations—although having the Angel of Death in your back pocket is, of course, an ace in the hole not available to most CIOs.

and energy in their 20s and 30s establishing high-profile careers, only to end up single, childless and bitter by 40. Using Elizabeth's story as an object lesson, it just goes to prove that such a fate is hardly a modern phenomenon but one that befell women back in the 16th century as well. Makes one cranky. Makes one want to cut off someone's head.

War and Basketball

In today's rough-and-tumble business world, the bejeweled image of Elizabeth I may not resonate. A better choice might be a slightly crumpled military man, someone like Ulysses S. Grant. In *Cigars, Whiskey and Winning: Leadership Lessons from General Ulysses S. Grant*, Al Kaltman reveals the Civil War general's surprisingly modern management side. To illustrate Grant's mastery of 250 principles of business success, Kaltman focuses on Grant's career ranging from his West Point days to his generalship in the war with Mexico and the war between the states. Among the tips Kaltman adumbrates are Grant's strategic planning prowess and his uncanny ability to learn from his mistakes, which, by the way, were legion. It's rather a shame that Grant couldn't translate his military successes into other aspects of his life. Before the Civil War, he was a spectacular flameout in commercial ventures, failing at real estate, farming and retailing. As president, he stood watch over an administration so corrupt and mired in special interests as to make the gang that ran Enron seem like a troop of Boy Scouts. (To be fair, it was never suggested that Grant himself was dishonest; he just made some poor staffing decisions.) But as a military man, Grant was indisputably a winner, a powerful and ruthless strategist: The sieges he levied at Vicksburg

and Petersburg stand to this day as models for sticking it to the competition on its home turf.

Given the state of the world, I can certainly understand if a military-themed book doesn't seem especially appealing. After all, and as we already stipulated, it is summertime. Thankfully, there's no shortage of business books written by coaches and other mavens of sport. One recent addition to the genre is *Leading with the Heart: Coach K's Successful Strategies for Basketball, Business and Life*, by none other than Duke University's head hoops guru Mike Krzyzewski (pronounced, unaccountably, *shuh-shef-skee*). Running an elite athletic program, writes Coach K, is a lot like managing any business because talented individuals have to come together, gel and work as a well-oiled unit toward achieving a common goal.

During his reign of more than two decades as Duke's head coach, Krzyzewski has certainly earned his reputation as a highly successful recruiter, motivator and organizer. Year in and year out, fans can see his Blue Devils at or near the top of the NCAA rankings. However, unlike just about any business on the planet, Coach K never has to contend with budget cuts or downsizing. He is never asked to win games with four players instead of five. One wonders how successful Coach K would be if he had to mold a winning team out of a bunch of clock punchers whose sole reason for showing up each day was to collect a paycheck. College basketball players, after all, sweat for glory, not silver.

Or perhaps I'm being naive.

So Many Books, So Little Time

If the above choices don't light your reading lamp, don't worry. There's never a shortage of oddly themed business books. How about one about the criminal underworld (*The Mafia Manager: A Guide to the Corporate Machiavelli*) or the spy trade (*CIA, Inc.: Espionage and the Craft of Business Intelligence*), just to name two.

Still, as I settle in for a summer's worth of reading, I can't help but wonder why business can't be a metaphor for other life endeavors, instead of the other way 'round. Wouldn't you read *Continuous Family Improvement: How to Fire Your Children*, by Jack Welch, in which he recommends letting go of underperforming progeny? Or *We Are the World 2.0*, in which Bill Gates tells the leaders of the world how to get along by getting on the same platform.

Now those I would read. **CIO**

Opinion Editor Megan Santosus is always looking for a good read. You can tout her on your favorite book at santosus@cio.com.



THE FOURTH ANNUAL

CIO 1000

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SUNDAY, AUGUST 18

8:00 AM – 1:30 PM

Golf Tournament

Tee up with *CIO* and our Corporate Partners on The Broadmoor's West Course, designed by Robert Trent Jones, and known for its challenging, steeply-angled greens.

3:00 PM – 5:00 PM

Registration

6:00 PM – 7:30 PM

Café 100 Reception

Meet and network with other participants, Award honorees and Symposium Partners in our informal networking environment.

MONDAY, AUGUST 19: TODAY'S CHALLENGES

7:00 AM – 8:00 AM

Registration & Breakfast

8:00 AM – 8:15 AM

Conference Welcome

ABBIE LUNDBERG

Editor in Chief,

CIO Magazine



8:15 AM – 9:00 AM

Future Forewarned

PAUL SAFFO,

Conference Moderator

Director and Roy Amara Fellow,

Institute for the Future

What business and technology developments will have the most impact on CIOs in the year to come? Saffo shares his choices and why he thinks these are the key ones to look out for.



9:00 AM – 9:45 AM

Achieving Global Integration at GM

CHERRI MUSSER

CIO - Supply Chain,

eGM, Onstar Information

Systems & Services



9:45 AM – 10:15 AM

Innovation, Leadership and Integration

CRAIG CONWAY

CEO, PeopleSoft, Inc.



10:15 AM – 10:45 AM

Mid-Morning Break

10:45 AM – 11:30 AM

Supply Chain Lessons Learned from the High-Tech Implosion

BUD MATHAISEL

Corporate Vice President & CIO,

Solectron

Inventory write-offs have been in the billions of dollars. This has been a financial problem for high-tech companies, and a particular embarrassment for those companies with vaunted Internet connections to their suppliers and customers. What went wrong? Was it the systems, processes, people or incentives that failed? Does a risk-based approach towards supply chain management have potential? Mathaisel presents his perspective and a framework for helping to prevent the reoccurrence of this expensive set of mistakes.

11:40 AM – 1:15 PM

Industry Briefings

Our corporate partners present case

studies and sessions on deploying the latest technologies and services.

1:15 PM – 2:45 PM

Working Luncheon: Special Presentation on Security and Privacy

This session is produced in cooperation with the National Critical Infrastructure Assurance Office (CIAO) in the US Department of Commerce.

2:45 PM – 4:00 PM

Privacy, the Law and CIOs

CHRIS HOOFNAGLE

Legislative Counsel,

Electronic Privacy

Information Center

Like it or not, as a CIO you will be highly involved

in your organization's electronic privacy policies — and their legal ramifications. We look at current and proposed legislation that will have major impact on CIOs, their corporate officers, customers and employees.



4:00 PM – 5:30 PM

CIO Executive Mindshares

Small working groups explore the leadership challenges and best practices of specific, critical IT/business topics. Members share experiences, lessons learned, mistakes and successes, and new ideas for tackling common problems. Session participation is limited to CIOs and senior IT executives.

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ation ■ Integration

6:00 PM – 7:00 PM

Café 100 Reception

Catch up with our Symposium Partners and other participants in our informal networking lounge. Develop relationships with peers who will serve as sources of information and inspiration.

TUESDAY, AUGUST 20: TOMORROW'S OPPORTUNITIES

7:00 AM – 8:00 AM

Breakfast & Informal Roundtable Discussions

Gather with *CIO* magazine editors and fellow attendees to discuss common problems and possible solutions. Each table has a specific topic; choose one and join in.

8:00 AM – 8:15 AM

Welcome

PAUL SAFFO

8:15 AM – 9:15 AM

The Information Revolution: Why This is Just the End of the Beginning

W. BRIAN ARTHUR
*Citibank Professor,
Santa Fe Institute*



According to history, in the first stage of a technology revolution, a period of speculation is followed by a crash. But we can expect more real innovation to come in the great build-out that follows, this time driven by the interconnection of business and the appearance of Web-based services.

9:15 AM – 10:15 AM

The Future of Technology in Business, Part I

While the pace of innovation and change in the tech sector has slowed dramatically, the real build-out — and the real transformation of business — is yet to come. New developments like the semantic web, virtual reality modeling language (VRML), wireless everywhere, cutting-edge security tools and techniques, and the ability of organizations to store and manage over a petabyte of information will make things possible that only the futurists dreamed about before. This panel of leading technologists explores some of these critical areas.

10:15 AM – 10:45 AM

The Future of Technology in Business, Part II

The morning's speakers gather for an interactive discussion about where these developments will lead today's organizations.

10:45 AM – 11:15 AM

Mid-Morning Break

11:15 AM – 12:55 PM

Industry Briefings

1:00 PM – 2:15 PM

Networking Luncheon

Savor lunch and the beautiful view from the Lakeside Terrace while you extend your peer network.

2:30 PM – 3:30 PM

Leading in the Next Business/IT Epoch

Moderator:

ABBIE LUNDBERG
*Editor in Chief,
CIO Magazine*

Panelists:

ROB CARTER
*CIO & Executive Vice
President, FedEx
Corporation*
JERI DUNN
CIO, Nestlé USA, Inc.
REBECCA RHOADS
CIO, Raytheon Company



IT is more exposed to, and embedded in, the business than ever before. As we emerge from the recession, what will be the next IT epoch, and how will CIOs best lead their organizations into it? This roundtable of CIO 100 Honorees discusses our current state of evolution, where we're heading and the requirements of the IT leadership role, including shifting accountability, governance and organization models, the challenge of ROI, and transformation vs. enablement.

3:30 PM – 4:15 PM

Closing Keynote

MICHAEL SCHRAGE
*Inventor, Columnist and Author of
"Serious Play: How the World's
Best Companies Simulate to
Innovate"*

4:15 PM – 4:30 PM

Closing Comments

PAUL SAFFO & ABBIE LUNDBERG

4:30 PM – 6:30 PM

Free Time/Informal Networking

6:30 PM – 7:00 PM

CIO 100 Awards Reception

Put on the evening wear for our special black tie reception, followed by dinner and the awards ceremony to recognize this year's CIO 100 Award Honorees.

7:00 PM – 9:30 PM

CIO 100 Awards Dinner and Ceremony

9:30 PM – 11:00 PM

Dessert Reception Hosted by CIO 100 Awards Ceremony Underwriter, PeopleSoft, Inc.

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EXECUTIVE Summaries

July 1, 2002

COVER STORY | Ethical Data Management

By Scott Berinato | 56

Customer data management traps CIOs between two loathsome roles—the bad guy and the fall guy. Either the CIO stops marketers from using data for purposes some customers are not comfortable with—stemming potential revenue streams—or the CIO imparts no ethical code and is left to explain why the company has allowed a customer's data to be exploited. AT&T Wireless, Qwest, Saab and Visa have all grappled with ethical data management, some choosing paths that led to public outrage. Companies must realize that, in the end, it's their customers who decide whether a company has acted ethically, regardless of what's allowed under law. Most unethical use of data happens through function creep, in which piecemeal requests to use the data mount to the point where the data is primarily used for functions that were never originally intended. CIOs need to put firm policies in place to stem the tide of function creep, as proposed in the six commandments of ethical data management in this article.

“Somehow, technology has led to this rogue theory that acquiring data about people gives you the right to own that data, that mere collection translates to ownership.”

—CHRIS HOOFNAGLE, LEGISLATIVE COUNSEL AT THE ELECTRONIC PRIVACY INFORMATION CENTER

Wal-Mart CIO Interview

By Abbie Lundberg | 64

IN A WIDE-RANGING exclusive interview, next-gen CIO Kevin Turner, 36, tells how Wal-Mart is coping with global growth despite a commitment to run IS centrally. It's a tricky balance of centralized systems and controls, and local flexibility in decision making. After some tough lessons in which users spurned new systems, Turner explains how the IS staff increased its project success rate by walking in the users' shoes before doing the system spec. Turner reveals the transformational technologies that have excited his interest, including voice over IP (VoIP), voice recognition and radio frequency identification, and “cheap chips” that will replace bar codes and enable customers to use their own wireless devices in the store. Turner also describes ways Wal-Mart recognizes projects in jeopardy and laments the large security investment dictated by vendors' vulnerable product designs.

JetBlue Airways Profile

By Stephanie Overby | 72

JETBLUE AIRWAYS began life four years ago with a plan to create a cost structure that could support low fares. It's proved successful—the company posted 2001 profits while its rivals lost billions. Innovative IT has been the key. JetBlue created the industry's first paperless cockpit, equipping pilots and first officers with laptops, saving 4,800 man-hours a year. JetBlue enabled VoIP lines for 600 at-home reservation agents. A tracking program accounts for all operational data (updated flight by flight), and an intranet connects 2,800 employees. Crew members use wireless devices to report and respond to irregularities such as weather delays. But CIO Jeff Cohen doesn't embrace all hot technologies. He ended wireless terminal check-ins when counter agents proved to be the faster way to get people on the planes. “If it doesn't make you efficient, it's not cool,” Cohen says.

Wireless Security

By Sarah D. Scalet | 80

BY GARTNER'S ESTIMATES, one in five companies has a wireless LAN that the CIO doesn't know about, and 60 percent of WLANs don't have their basic security functions turned on. Governed by the 802.11 standard, WLANs transmit data by radio waves, signals that can be picked up by a \$70 wireless network card. An audit for WLANs will help locate rogue installations and also determine how far the signal is transmitting. If the signal is stronger than it needs to be, the amplification level often can be turned down. Beyond that, CIOs have five options, depending on the sensitivity of the data and how the wireless devices are used. They can make sure there is full use of built-in security features, wall off the WLAN from the rest of the network, encrypt data end to end, implement proprietary security add-ons or wait on the creation of standards for new levels of encryption.

Asia 101

By Tom Field | 88

SINGAPORE IS WHERE businesses go to get their feet wet in Asia. Attractive to Western business interests since 1819, Singapore is host to 6,000 multinational companies, all seeking the opportunities of the Asian market. Successful global players need to know the rules of engagement with the government and culture of this tiny Pacific island city-state. The business-friendly government facilitates partnerships. The high-tech and financial services industries are lightly regulated, and telecom was privatized in 2000 (the infrastructure is state of the art, a rarity in Asia). But there are restrictions for media and entertainment companies. And multinationals shouldn't expect cheap labor. Singapore has a shortage of IT workers, and they command \$24,000 per year on average—twice the pay of top programmers in India. In “Asia Scorecard,” CIO compares Asian capitals according to their IT infrastructures, IT work force, Internet penetration numbers and other metrics important to analyzing opportunities.

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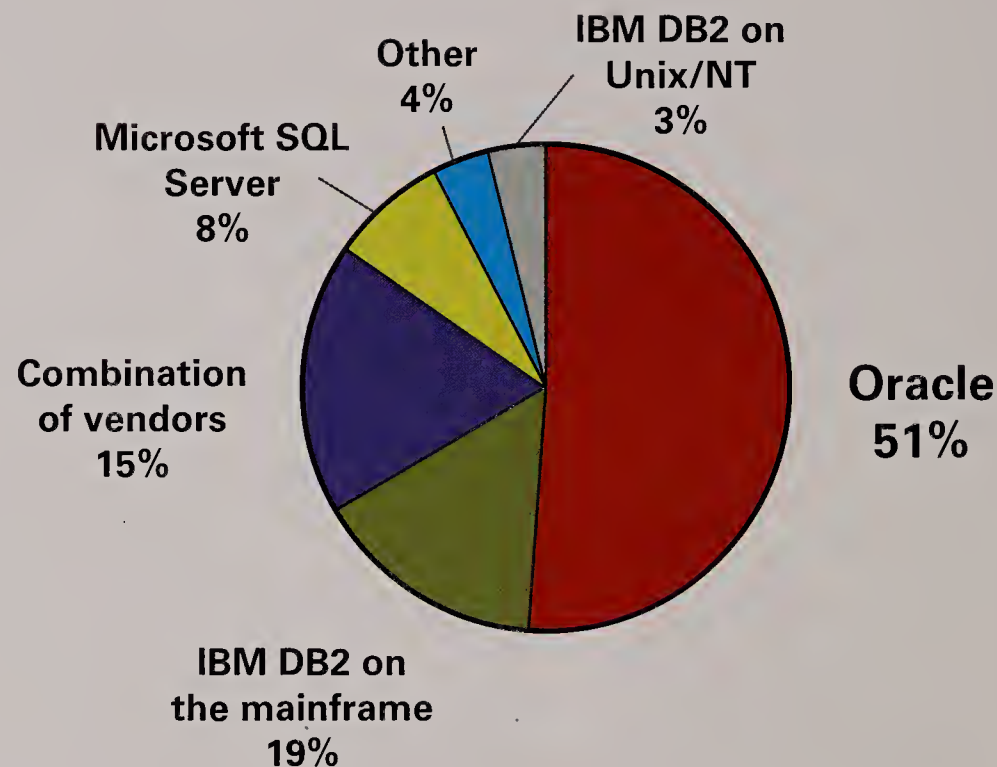
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